THE CHANGING ROLE OF THE HEALTH SCIENCES LIBRARIANS WITH THE INTRODUCTION OF PROBLEM-BASED LEARNING AT THE NELSON R. MANDELA SCHOOL OF HEALTH SCIENCES, UNIVERSITY OF KWAZULU-NATAL

A RESEARCH PROJECT

submitted in partial fulfillment of the requirements for the degree of Master of Education (Higher Education)

Centre for Higher Education Studies, School of Adult & Higher Education, University of KwaZulu Natal

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Dear Ms. Moodley

ETHICAL CLEARANCE APPROVAL NUMBER: HSS/0435/08M

I wish to confirm that ethical clearance has been approved for the following project:

"The changing role of the Health Sciences Librarians with the introduction of problem-based learning at the Nelson R Mandela School of Health Sciences, University of KwaZulu-Natal"

PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years

Yours faithfully

Pximba
.....
MS. PHUMELELE XIMBA

cc. Supervisor (Mrs. R Searle)
cc. Mr. D Buchler

DECLARATION OF ORIGINALITY

I declare that this dissertation is my own work and that all sources I have used or quoted have been indicated and acknowledged by means of complete references.

K.R. Moodley

Durban

March 2006

DEDICATION

In loving memory of my parents

for their care, guidance and love over the years

Mr M. R. Moodley
(5 May 1913 - 26 February 1989)

Mrs M. Moodley (Parvati)
(6 June 1913 - 7 December 1988)

ABSTRACT

From 1950 to 2000 the former Faculty of Medicine, University of Natal, Durban, pursued the traditional, didactic curriculum. The implementation of problem-based learning, Curriculum 2001, introduced many changes in the curriculum where facilitators guide instead of teach students. Based on this it is important to understand the principles of problem-based learning (PBL) more extensively and the demands that may be made on the Library and the Librarians. It is assumed that a partnership exits between the librarians and the School of Undergraduate Medical Education (SUME).

The object of this study is to determine whether the introduction of Curriculum 2001 impacted on the role and functions of the library and the librarians. The 5th year students from the Traditional Curriculum and 2nd year students from Curriculum 2001 were selected to participate in this study.

The methods used in this study were the analysis of the minutes of the meetings that were held to discuss and plan Curriculum 2001 of the Curriculum Development Task Force, questionnaires for the undergraduate students and semi-structured interviews with the facilitators in Curriculum 2001 and medical librarians. The minutes of the CDTF were examined to ascertain if the librarians had any input in Curriculum 2001. The interviews would determine whether PBL had an impact on the role and functions of the library and the librarians. Four librarians and 15 facilitators were interviewed.

Quantitative and qualitative methods were used in this study with the assistance of the EPI Info and NVivo software to analyze the results.

The results of this study indicated that there is room for greater and enhanced collaboration and faculty partnerships between SUME and the library to assist the students to improve and develop their information literacy skills that are integral part in problem solving in the PBL curriculum.

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LIST OF ABBREVIATIONS

Curriculum Development Task Force	CDTF
Inkosi Albert Luthuli Hospital	IALCH
Medical Education Development	MEDev
Medical Librarian	(The) Librarian
Medical Library	(The) Library
Natal Provincial Administration	NPA
Online Public Access Catalogue	OPAC
Open shelf / shelves	O/S
Problem-based learning	PBL
Reserved Book Room	RBR
School of Undergraduate Medicine	SUME
Selective Dissemination of Information	SDI

TABLE OF CONTENTS

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

In the light of the changing health requirements and the need for medical education reform, many medical schools internationally had to extensively review their undergraduate teaching programmes to prepare medical students in the Problem-based Learning (PBL) environment of today to become tomorrow's doctors who have acquired the skills of critical thinking through self-directed learning (Kwan, 2000). The Dean and Members of the PBL Committee, Faculty of Medicine, National University of Singapore (NUS) said they have recognized that there are "a number of potential shortcomings" with the existing traditional undergraduate curriculum" (Kwan, 2000). They continued to say that the traditional, lecture-based teaching encouraged a passive learning environment that prompted memorization and rote learning of facts for examinations. With new technologies affecting the world, medicine included, the explosion of knowledge and knowledge dissemination has meant that rote learning, once off learning becomes increasingly problematic. Students will need to learn how to learn and how to access knowledge rather than carry it all in their heads. Equally, as the students' needs to read more new materials grew, so did the curriculum too. It became crammed until there was no more space to include more information, creating a crisis. In addition, to encourage independent learning and critical thinking among the students instead of the traditional teaching, note taking, distribution of lecture notes and handouts, the academics saw the need to revise the existing medical curriculum where the students could access additional information by themselves.

Nandi, Chan, Chan, Chan (2000: 301) share a similar view to the Dean of NUS that the lecture based curriculum does not impart a life long respect for learning. They add that in 1899 Sir William Osler recommended that the lecture-based method of teaching should be abolished and that the students should be allowed more time to study. He also emphasized the importance of assisting students to observe and think for themselves. Nandi continues to advocate that the undergraduate medical education, like any other educational programme, requires ongoing improvements to meet the changing demands in the 21st century. Literature indicates that academics that wanted their students to learn, remember and apply their knowledge in the traditional curriculum were often disappointed. PBL was the right response to replace the traditional curriculum in many medical schools, like McMaster University in Canada and Maastricht University in the Netherlands did in the mid 1960's. Too many students memorize, forget, and fail to apply or integrate knowledge and also resist further learning whilst PBL fostered more positive attitudes to learning in them.

Studies on assessment states that assessment of today's approach to veterinary education reveals a system overloaded with facts and students stressed to memorize and recall medical information. The Mississippi State University College of Veterinary Medicine has agreed on a path to reduce the curricular information overload by the incorporation of computers into the curriculum and together with problem-based learning activities to prepare students to become information literate individuals.

Epstein (2004) says that the past 12 years saw a rapid growth of biomedical knowledge, which resulted in a shift away from the didactic based teaching towards PBL. He continues to add that many doctors have said that their medical education began seriously on their first day that they entered the wards. Differences between the traditional and PBL curricula arose where the students felt motivated to acquire the competence of a practicing doctor (PBL) than to absorb large volumes of theory (traditional curriculum). Epstein goes on to say that information in different areas of knowledge is expanding at different rates and in turn differs at different times. To cope with this increase in knowledge, most curricula add new modules or themes to cover the areas of rapid growth. PBL satisfies this need as students are expected to read more widely surrounding the topic rather than concentrating on information from prescribed or recommended reading material. The traditional curriculum emphasizes content rather than the learning processes.

Wallace (1997: 255) says that the challenge of medical education is to produce an environment where students learn how to ask questions and find the answers themselves, to use the power of information technology, to work and study in teams, to make decisions based on evidence and to observe physicians who include patients when making decisions about their lives. He also says that the goal is learning and not instruction.

The views on the traditional lecture based teaching vs problem-based learning and the need to revise the medical curriculum held by the Dean and the PBL Committee of NUS, Nandi, Bushby, Epstein and others pose many challenges to the medical educators with

regard to what the students should learn and know and how it is to be done. Therefore the recent trend towards problem-based learning has been one of the most significant changes made at medical schools all over the world. PBL developed largely in response to the calls for reform and change in medical education. Whilst PBL encourages students to work independently and in small groups, traditional, didactic lectures may lead to memorization. Knowledge explosion, especially in medicine and the sciences is growing at a very rapid rate. The traditional medical curriculum was constantly revised to accommodate the knowledge explosion until there was no space left. The students had no option but to rote learn as a result of the enormous amounts of information and knowledge. This did not mean that they did not necessarily know how to learn or what to learn or how to access the information. They needed to learn and acquire life long learning skills to access information in the various formats, not only from the recommended textbooks. Knowledge changes ever so fast that what you learn about some disease now may well have been superseded by additional information and knowledge in the next 6 months or a year. Studies in the 1970's indicate that with the continually changing and expanding bank of information, students must have an adequate knowledge of secondary information sources and how to use them in an efficient manner. By secondary information sources they were referring to the databases and electronic material and the internet.

The information explosion is self-evident to anyone working in the library, even in the field of medicine the information explosion is a fact of daily life more pressing than in other fields. To illustrate information explosion she adds that more than 2 million articles are published annually in about 21, 000 biomedical journals which is understood to be

increasing by 4% each year. Added to this is the publication of books and other electronic material. In order for users, especially academics and students, to utilize the library's resources effectively, adequate and proper information literacy programmes are necessary. This would enable the users to develop critical thinking and lifelong learning skills in information retrieval.

1.2 PROBLEM-BASED LEARNING

"Problem-based learning (PBL) is an approach in which the problem comes first where knowledge is developed during the process of studying problems or real-life scenarios". (Morrison 2004: 174). The PBL format encourages self- or group-directed learning in trying to solve a problem. Norman and Schmidt (1992: 557) say that PBL has caused a small revolution in medical education from its beginning at McMaster University in the mid-1960's). According to Barrows (2000), McMaster created this "revolutionary problem-based curriculum" after all the planning and structuring of the curriculum over a four-year period. This form of teaching was undertaken by a few medical schools around the world, like Maastricht University in the Netherlands and the University of Newcastle in Australia. Barrows continues to add that over the past ten years many new and developing countries have also initiated the PBL curriculum in medical education. PBL may be illustrated as a set of carefully selected and constructed problems or cases of real-life scenarios presented to small groups of students. These cases more often than not consist of descriptions of a set of observable events that need to be explained. In medical education, the cases usually take the form of patients presenting with complaints and symptoms. The students meet in groups in a tutorial and discuss the these problems and

produce provisional explanations for the events, the source of the condition described, its physiological processes and the mechanisms through which it extends from a certain area to other areas of the body. Prior knowledge of the problem is insufficient for them to understand it in depth. (Norman & Schmidt 1992: 557)

Barrows and Tamblyn (1980) said that the primary aim of PBL is to encourage problem-solving skills in students. Barrows assumes that through constant and continuous exposure to real-life problems, students will acquire the expertise of evaluating a patient's problem. Another goal of PBL is to enhance acquisition, retention and use of knowledge (Norman & Schmidt 1992: 558). In PBL students are expected to become independent learners, reason their way through patient problems, recall and apply what they have been taught at medical school, recognize when their skills and knowledge are not adequate to the clinical task they are performing and to acquire new information and skills as they need it and retain their knowledge and skills (Barrows, 2000). Some of the literature on PBL says that although students and their facilitators discuss the cases in their tutorials and they (students) may have prior knowledge of the problems, they also need to acquire more knowledge to determine the source and treatment of the problems. The library provides the additional resources for the students and the librarians teach them how to use these resources effectively to retrieve relevant information related to the problems or cases.

In the traditional curriculum the Medical Library provided the necessary resources for the students, which were mainly prescribed and recommended textbooks. The 1st, 2nd and 3rd

year students had little call to use the library as they may have purchased their own prescribed and recommended textbooks. The 4th, 5th and 6th years of the curriculum involved more of the clinical work in the hospitals. They use the library more frequently in their postgraduate study because they are expected to read more journal articles, which are current information to widen their knowledge. On the other hand the need to provide yet more for the students in PBL is even greater due to the nature of the learning process. Students are expected to read around the problem as well as the problem itself to gain a better insight into the problem and its causes, symptoms and treatment. Based on the nature of teaching in PBL it is assumed that the students cannot fail to use the library. Therefore the assumption is that the role of the Medical Librarians has changed from teaching students how to locate library material in the library to that of teaching them how to use the library's resources to find relevant information, to teach them the skills and techniques required to access information effectively and efficiently and to instill these life-long learning and critical thinking skills with regard to information retrieval.

1.3 INFORMATION LITERACY / LIBRARY INSTRUCTION

The terms information literacy and library instruction are often used interchangeably used by authors in most of the library literature. For many years the teaching of Information Literacy has been an area of particular interest to librarians. Weiss acknowledges Lee (1966), "Bibliographic initiatives and information skills programs have roots in tradition dating back more than two centuries" (Weiss 2003: 233).

Information literacy standards usually recommend that research begin by making certain that the nature of the problem is completely understood. Otherwise, much time is wasted.

According to Milbury and Silva (1998: 45) far too frequently students in the library are unfocused and wasting their time. When asked what they are looking for they have great difficulty explaining, because they don't understand the problem. Information literacy also addresses the selection of appropriate resources, analysis, and evaluation of the information retrieved the presentation of the findings or solution, and evaluation of both the outcome and process used.

PBL follows a similar path through periodic brainstorming sessions, led by the facilitator, in which three essential questions are addressed in order to guide the students in their work:

- what do I know about the problem?
- what do I need to know in order to find a solution?
- where can I find the information needed?

The Nelson R. Mandela School of Medicine, hereafter referred to as Medical School, followed similar steps to those described by Milbury and Silva (1998) and which are discussed in the section on Curriculum 2001 at the Medical School.

Information literacy has a variety of definitions, some of which are:

- the ability to develop search strategies and skills to use the databases;
- the ability to develop critical thinking and lifelong learning skills; and,
- the ability to access, evaluate and use information from a number of resources.

According to Weiss (2003), these definitions describe an information literate individual, competent in accessing relevant information using the available resources, assessing

alternatives with critical thinking and utilizing the information with discretion to meet life's everyday challenges (Weiss 2003: 234).

In addition to the views of Weiss (2003), Farber (1999) say that many college librarians had been giving library instruction in the use of the library for over a hundred years. According to Evans (1914) (as cited in Farber, 1999: 171), a survey done by the U. S. Bureau of Education found that about one fifth of the four hundred and forty six college and university libraries offered library instruction. Another survey carried out many years later, in 1965 of instructional programmes provided by the librarians, of one hundred and fifty seven colleges showed that although most of the libraries offered some form of instruction, not nearly enough was done and that the faculty cooperation was minimal (Phipps 1968). However, Farber (1999) adds that such instruction was very basic and did not play a very significant role in the students' education.

Bailey-Hainer and Forsman (2005: 504) asks the question, "How can the library play a major role in the teaching mission of the university instead of being viewed as part of student or other intangible support services?" Some librarians say that the new academic librarians are facing the balancing of job responsibilities and needing to engage in their own professional development. According to Flatley and Weber (2004: 488), "…in addition to all the demands made on them the new academic librarian is expected to become involved with professional development activities. S/he must participate in workshops, classes, and other activities that increase his/her knowledge of the profession."

1.4 ROLE OF THE LIBRARIAN AND THE LIBRARY

Much has been written about the importance of information literacy and the role it plays in the lives of students. The concept of information literacy developed many years ago and its growth is mainly due to the variety of information formats available and information explosion. According to Grafstein (2002: 97), “In view of these alternative information sources, many librarians were discovering that teaching only the traditional tools did not prepare students to use these new search tools effectively”.

Change has been ongoing and far-reaching in libraries for the past thirty years. The roles of the academic librarians are indicative of this change (Cardina, Wicks 2004: 234).

Ducas (2003) says that the driving force behind the changing roles and responsibilities of academic librarians include the paradigm shift in the way that information is retrieved, delivered and managed (Ducas, Michaud-Oystryk 2003: 55). The librarians have to develop existing skills and learn new search strategies and techniques so that they can retrieve information effectively and efficiently. The interfaces of the academic databases are constantly changing in keeping with new technological developments. The librarians are updated to these changes by means of e-mails alerts and vendor training. The wider academic community, comprising undergraduate and postgraduate students, academic staff, researchers, and visitors were taught information literacy for many years using search techniques in the traditional way. This included using the printed bibliographies where they could either search a proper subject heading or an author. Today, Information Literacy is still being taught by the librarians, except that information is accessed and retrieved using the electronic media. Complex searches can be done by combining a

number of search options eg authors, keywords, subject headings, publisher, and phrases of words. Cardina and Wicks comment on the electronic age and say that the rapid growth and automation of information systems are also responsible for the change in the library environment and the services offered by the reference librarians (Cardina, Wicks 2004: 133).

The librarians have to keep up to date with the rapid growth of electronic information on the internet and the academic databases, the ever increasing number of databases available in every discipline, and the bibliographic tools eg Endnote Plus and RefWorks. They need to be trained in new skills so that they can become experts in their new roles as research and teaching librarians. These skills can be developed through formal training or professional development programmes.

According to the American Library Association (ALA) the academic and research libraries accepted the changes in digital technologies and have trained and empowered students, academics and researchers in the academic environment. The librarians had no choice but to acquire skills and techniques to access electronic material through training from the vendors of databases and electronic media so that they could become competent and confident themselves to teach and train the students on how to use and access relevant information effectively and efficiently from the databases and electronic media.

In spite of this, the libraries and the librarians are asking themselves the following questions:

- to what extent are academic libraries likely to change?
- what will be the new roles of the librarians in this changing information environment?
- what aspects of the academic library will be resistant to change?
- what will be the impact on academic libraries if universities and colleges change the way they disseminate knowledge?

To attempt to answer these questions is to realize that the future represents an age of transformation for academic and research libraries. .

The American College of Research Libraries says that the changes that are occurring – in technology, in research, teaching and learning – have created a very different context for the missions of academic and research libraries. Libraries, in the past, were regarded as repositories and guardians of knowledge. Presently, the information explosion and the changes that are occurring far exceed the library's expectations of being regarded as just repositories and guardians of knowledge. Most libraries have made significant strides in providing users with the organizational standards and strategies to access information beyond their own resources, like the internet and inter-library loans. These changes in academic libraries can be described by looking at how the jobs of academic libraries and librarians have changed, how the institutions and organizations have changed and how the users have changed. This evolving environment can afford an opportunity if libraries and librarians can respond to these changes proactively with a vision for the future.

In academic librarianship the two forces are driving change significantly are the budgets and technology. Budgets are forever decreasing at a rate that outpaces demand. Technology and the gathering of information on the other hand are progressing at an alarming rate that is putting the academic librarians to the test in managing the information explosion. Over the past few decades there has been a slow but persistent change in how academic libraries are organized. Academic librarians, themselves, were either reference librarians, cataloguers, readers' advisors, or were involved in Library Orientation and Library / Bibliographic Instruction whereby the students were shown how to use the card catalogue to locate books and journals on the shelves. Although technology was introduced into the academic library environment, not much emphasis was placed on the retrieval of information using the various databases and the internet. The academic librarians were more concerned with teaching and showing the borrowers how to find information in their libraries.

The theory of Bailey-Hainer and Forsman (2005) advocates that funding to the academic libraries will be reduced unless the academic librarians do a better job providing a clear picture of the library of tomorrow. Administrators of academic institutions and the libraries understand that huge changes are taking place as electronic formats quickly overshadow and take the place of the print dissemination of information.

1.5 TRADITIONAL CURRICULUM AT THE MEDICAL SCHOOL

Undergraduate medical education at the Medical School from its inception in 1950 until the end of 2000 pursued the form of formal lectures to large groups of students, which are

referred to as the traditional or didactic lecture-based curriculum. Although PBL, hereafter referred to as Curriculum 2001, was introduced at the Medical School in 2001, both curricula continued concurrently until the traditional curriculum was phased out in 2005.

The traditional curriculum was a six year degree where the students attended lectures daily for the first three years given by experts in their fields. Didactic / formal teaching was the means of instruction where the students were given notes, handouts and / or wrote down notes themselves. Students who did not attend classes were able to get their notes from their colleagues. From the 4^{th} to 6^{th} years, the students were exposed to clinical work together with formal lectures. These classes comprised about two hundred students. The traditional curriculum encouraged memorization and rote learning whereby students did not have to find any additional information because it was given to them in one form or another either as prescribed texts, lectures, student notes and handouts. The teaching of students in the traditional curriculum was more conventional and the roles of the students were more passive unlike in PBL. The students were not really engaged in the learning process like finding information, as is the case in PBL.

In the traditional curriculum the lecturer decided what information and skills the students were expected to learn, how they should learn, the sequence and the pace of what was to be learnt. One of the advantages of lecturing to large groups in the traditional curriculum was that the lecturers, who are experts in their specific disciplines, were able to share their knowledge of patient care and research with the students through lectures. This did

ensure, to a certain degree, that the students were exposed to almost all the knowledge and concepts that were relevant. The questions asked are, having been exposed to all this knowledge how much did they learn, how much did they retain and how much did they understand?

On completion of the medical degree, MBChB, the students were allocated to any hospital in South Africa to for their internship programme for one year after which they became fully fledged doctors and were allowed to practice on their own if they so desired.

1.6 CURRICULUM 2001 AT THE MEDICAL SCHOOL

In keeping with the changes in medical education the Medical School phased in a 5 year integrated PBL curriculum in 2001, known as Curriculum 2001. The traditional, lecture based curriculum still continued until Curriculum 2001 eventually replaced it.

The integrated Curriculum 2001 is characterized by self-directed, patient-oriented learning with "horizontal and vertical integration reflected in the merged clinical and pre-clinical content". (van Wyk and Madiba, 2006: 3-4). She adds that true integration occurred both vertically and horizontally of the basic sciences and the clinical disciplines in each unit of learning of the first three years in Curriculum 2001. Teaching and learning in the 4^{th} and 5^{th} years become more clinical as students rotate through clinical disciplines.

Literature on PBL indicates that the original development of this form of instruction in medical education started at universities like McMaster (Canada), Maastricht

(Netherlands), Linkoping (Sweden) and Newcastle (Australia). Today, PBL has become widely used internationally in higher education not only in medical schools.

The Medical School implemented Curriculum 2001 after four years of preparatory discussions, faculty consultations and decisions on issues of content and structure of the curriculum. The different disciplines that form the basis of Curriculum 2001 are integrated within themes of 18 modules over 5 years. (van Wyk and Madiba, 2006: 3). The students are divided into small groups of ten and are allocated to a trained facilitator for the duration of a theme. There are two tutorials per week to discuss one or two case scenarios. At these tutorials the students learning begins with a case scenario, which stirs their curiosity and assists them to focus on the key issues of the problem. They have to follow the Eight Learning steps in PBL, designed for Curriculum 2001, to identify the learning issues required for their research. The Eight Learning steps are:

- Step 1: Define words and concepts
- Step 2: Identify main issues
- Step 3: Brainstorm explanations for main issues
- Step 4: Identify questions to be answered
- Step 5: Formulate learning goals
- Step 6: Realize requirements for learning goals
- Step 7: Share the knowledge
- Step 8: Evaluate your learning

Students and facilitators work together in steps 1-5 in their first tutorial, students work by themselves in step 6 and they meet again with their facilitator in the second tutorial in steps 7-8. These are the eight steps in the PBL learning process at the Medical School as compared to the three steps described in the section on Information Literacy / Library Instruction by Milbury and Silva.

The Medical Librarians role has changed from that of teaching the students in the traditional curriculum on how to find books and journals on the shelves using the Online Public Access Catalogue (OPAC) to that of teaching the students in Curriculum 2001 on using the library's resources effectively and efficiently to locate relevant information. In addition to teaching the Curriculum 2001 students how to use and locate books and journals in the library, the Medical Librarians worked in collaboration with the coordinators of the themes in the curriculum to familiarize themselves with the content, the extent to which they could assist the students and to organize teaching sessions with the students. This collaboration was short lived as the library was phased into insignificance as Curriculum 2001 progressed into successive years. They taught the students how to access and use the electronic databases in order to retrieve relevant journal articles efficiently, how to access and evaluate websites on the Internet effectively and assisted the students either in small groups or individually in their research which involved steps 1-6 in the Eight Learning steps in PBL. Rankin (1999: 201) says that in order to position the library as an effective partner in the PBL curriculum, it is important to be familiar and up to date with PBL's basic principles as well as the "hot topics". The librarians should be aware of the contents of the curriculum so that they understand the students' needs when they require assistance in using the library resources to gather information.

1.7 CURRICULUM 2001 AND THE MEDICAL LIBRARIANS

Although collaboration and partnerships between faculties and librarians is discussed at length in library literature and the academic environment, it is yet to be seen if this is the

practice or not. One of the partnerships is between faculty and the library collection development where funds are allocated on examining the collection based on costs, research output, curriculum requirements, and a few other factors.

The questions that arise with regard to the collaboration between the faculties and the subject librarians are:

- does it exist or not?
- do the faculties involve the librarians in curriculum development programmes and meetings?
- do the librarians feel adequately trained to teach the academics and students? and,
- do librarians supervise the (s)elective programmes?

Donham and Green say, “Collaboration between a librarian and a faculty member has several important attributes: mutual goals, mutual respect, advance planning, and substantive contributions by both parties for designing instructional goals …”
(Donham, Green 2004: 314).

According to Doskatch (2003: 112) the librarians in Australia are urged to form partnerships with the Federal Government in order to assist “faculty create learning environments that require students to be actively involved in filtering, critically analyzing and synthesizing information from a wide variety of information sources and formats outside the traditional lectures …”. Some of the notable objectives of Curriculum 2001, as described under the section ‘Curriculum 2001 and the Medical School’ are self-

directed learning, critical thinking, and acquiring life-long learning skills to become tomorrow's doctors.

One of the challenges that librarians face in the faculty-librarian collaboration is the challenge the power quotient in universities and develop, explore and foster strategic teaching and learning alliances.

Professor Renfrew Christie, a professor at the University of Cape Town, said in a presentation at the Training Programme for Research Librarians, held in Stellenbosch in September 2007, that librarians must become more assertive in promoting themselves to the wider university community, form partnerships and work together with the faculty. He also stated that a good librarian should be like a grand master of chess, knowing what her Professor should be asking her to read next and that great academics stand on the shoulders of greater librarians.

1.8 PURPOSE OF THE STUDY

Information-seeking skills, critical thinking, the acquisition of problem-solving skills and lifelong learning skills are central to PBL. This research study will look at the perceptions of the academic staff, facilitators and the librarians on the role and function of library and librarians, the attitude of the students towards information retrieval and problem solving with regard to PBL and are they aware of the library's resources available to satisfy their needs.

The research questions that this study intends to find answers for are:

- How has the introduction of PBL impacted on the role and function of the library and the librarians?
  - what do staff see the role of the library and the librarians to be?
  - what changes have the librarians noticed and how are they responding?
  - what do the students feel that the library can provide for them?
  - are they aware of the resources in the library?
- What information retrieval skills do the students have and are they adequate for the demands of PBL?
  - can they retrieve, manage and utilize biomedical information for problem solving other than recommended texts?

It appears through observation, practical experience, the increasing access to the databases for academic research and teaching and the increase in one-on-one teaching that the subject / reference librarians are now more involved in research and teaching than was the case ten years ago. It is necessary for the medical librarians to keep abreast of the changes in technology, research, teaching and learning, in the light of the explosion of new information and knowledge daily in academic databases as well as scholarly information on the search engines like Google Scholar. One way to develop confidence in the students, researchers, academics to become critical thinkers and for them to acquire lifelong learning skills in order to retrieve relevant information is for the librarians to transmit their newly acquired knowledge and skills to them. To achieve this there should be more collaboration and partnership between the faculty,

researchers and the librarians not only for collection development but in other areas that affect research and teaching.

1.9 SUMMARY

The PBL curriculum uses case-based study, and involves small group learning and facilitation where students must actively participate in the discussions surrounding the cases. The students also assume responsibility for their own progress and education due to the nature of problem-based learning. There is no large group teaching by lecturers as was the practice in the traditional curriculum. The facilitators in PBL act as guides to the students. The purpose of this study is to determine if Curriculum 2001 has had an impact on the attitude of information gathering habits of the students, if they utilizing the library's resources optimally and has it made a difference to the role and functions of the library and the librarians.

CHAPTER 2

THEORY: PROBLEM-BASED LEARNING

2.1 INTRODUCTION TO PROBLEM-BASED LEARNING

Problem-based learning (PBL) in medical education is increasingly becoming a new educational model that brings with it new challenges and new opportunities in the health sciences libraries and for the librarians. Medical educators and have questioned whether the students in the PBL curriculum use the library and its resources and services differently from the traditional students (Marshall, Fitzgerald, Busby and Heaton, 1993). The response by Block (1997, p. 2) is, “Research has demonstrated that students in PBL programs do indeed use the library differently than do students in conventional medical programs”. Studies at medical institutions like McMaster University in Canada and the University of New Mexico in the United States of America provide evidence that library resource use is one of the primary differences between PBL and traditional medical students. Tooey (1993) says that whether an institution is considering a complete shift to PBL or looking at methods for a partial integration of PBL, there is a role for the library to play.

2.2 WHAT IS PROBLEM-BASED LEARNING?

Problem-Based Learning (PBL) is a powerful educational model that has its roots in the learning by doing. Initially developed a quarter of a century ago in medical education, it has now become increasingly used at all educational levels and in a wide range of

professional schools. PBL is a method of learning in which students first come across a problem, followed by a student-centred inquiry process. (Schmidt, 1993). It engages learners in an active, collaborative, student-centered learning process that develops problem-solving and self-educational abilities needed to meet the challenges of life and career in today's complex environment. It also allows the learner to acquire an integrated knowledge base, structured around real world problems, the problems the learner will face in future work or profession, community and personal life. Acquiring knowledge in the contexts in which it is to be used makes it possible to recall the knowledge application when necessary.

In PBL, students are actively involved in their own learning. Problems play a key role in this process. Preliminary discussion in the small group will help students gather together whatever knowledge is already available. Based on this prior knowledge, learners actively create explanatory models, which in turn facilitate the processing and comprehension of new information. In addition, the new information is better understood because students are stimulated to elaborate on it. Elaboration in the tutorial group takes place through discussion and through answering questions. (Evensen & Hmelo, 2000)

Problem-based learning is a student driven process, which involves self-centred studying. According to Rankin (1999)**,** contemporary PBL programmes usually consist of two main principles. The one is that the basic sciences involve the process of analyzing typical cases and the other is that the self-centred learning is motivated by student curiosity. When analyzing a case, the students identify a problem which then becomes the learning

goal for them. The students will eventually reach a point where more information is needed to continue in order to complete the case. Each student must find answers to the problem and be prepared to share the information they have found in their small tutorial groups. These tutorial groups comprise of up to ten students plus the facilitator or tutor. Therefore PBL encourages and forces the students to search for relevant resources and information to generate answers and contribute in their small group tutorials.

In problem-based learning, the students ask the questions and provide the answers. The facilitators do not teach the students but merely act as guides to prevent them from straying from the problem itself. Barrows and Tamblyn, (1980) said that the great wealth of information that we have in our memory banks are there because we worked with the problems with which we were faced. Unlike problems that we have to face and solve as we encounter them in our daily lives, the students are given the facts or principles and apply this knowledge to solve the problems. In problem-based learning the students become active participants in the learning process. They also acquire the ability to assess and evaluate their own strengths and weaknesses. Information seeking skills are vital to problem-based learning, which emphasizes self-centred learning and the acquisition of problem solving and lifelong learning skills. The Medical Library takes an active role in teaching the students on how to acquire these life-long learning skills by providing Information Literacy on an ongoing basis so that they are able to locate resource material from the library itself, the Internet (World Wide Web), and databases, and how to reference the material they have consulted. Students feel confident searching the Internet. It is the first place they would go to for all kinds of information.

Donner (1993) says that PBL is a form of education in which information is mastered in the same framework in which it will be used. Also, in its most recent medical forms, PBL is seen as a student-driven process in which the student sets the pace and the role of the teacher becomes one of a guide, facilitator, and resource. PBL begins with genuine, open-ended problems given to students with many potential answers. The students discuss the problems and the gaps identified in needed information become the students learning goals. Research and information retrieval begins where access to information and the many resources available becomes the focus. The facilitator, who replaced the teacher, acts as a guide does not provide the answers to the problems but acts as a guide and prompts the students to consider steps for research into the problem. Successful problem-based learning offers considerable educational flexibility where the students and facilitators engage in a process of discovery and learning.

The main aim of problem-based learning is to teach problem-solving skills so that the clinicians are able to make sound judgements. Another aim is to integrate the basic and clinical sciences throughout the curriculum, which should assist the students to see the relevance of the basic sciences to the practice of medicine. Many variants of PBL has evolved over the years and yet its essential elements, that of the content and the process of learning have remained constant.

2.3 PROBLEM-BASED LEARNING AND NON PROBLEM-BASED LEARNING

A study of junior doctors conducted by Prince, van Eijs, Boshuizen (2005) compared the opinions of graduates from the problem-based learning and non problem-based learning

environment because problem-based learning is supposed to enhance general competencies. Overall, the problem-based learning graduates appeared to be more satisfied with their knowledge and skills. The results also suggested that the graduates from the problem-based learning environment were better provided with respect to several of the competencies. A number of reasons are given for the stress that students and facilitators in a PBL curriculum experience, says Miflin, Campbell, Price (1999), some of which are that the facilitators experience difficulty in defining their role, the students lack the confidence as to how much or how little information they should bring to the tutorials and the curriculum tends to have too much content. Lecturers who have become facilitators find it extremely difficult not to teach but to guide the students in PBL.

Problem-based learning professes to enhance problem-solving skills, independent learning and teamwork skills. Some studies have found that the graduates from the problem-based learning schools were better prepared in terms of general competencies. A significant difference between the problem-based learning and non problem-based learning graduates was that the problem-based learning graduates had learned communication and problem-solving skills primarily in medical school whereas the non problem-based learning graduates learned these skills on the job. The results of the study by Prince et al does show that problem-based learning does enhance the level of skills displayed in general competencies such as communication and problem-solving skills. The competencies with the highest reported frequency of usage were expert knowledge, profession-specific skills and communication skills. It is possible that communication

skills and expert knowledge are two of the many attributes acquired by the students that are on the top may be as result of the fact that the students in problem-based learning as opposed to non problem-based learning have to become independent learners. For the students at the Nelson R. Mandela School of Medicine to become independent learners they have to find relevant information for themselves and when they have located the relevant information they feel confident to talk and discuss their cases in their small group tutorial sessions. In order for the students to locate the relevant reading material they have to have the knowledge and skills on how to access and search the resources in the library including OPAC.

The non problem-based learning students, the traditional curriculum students, have always been "spoonfed" at their lectures where they were given notes and were directed to their prescribed and recommended textbooks for further reading. They did not access additional reading material using the databases and rarely used OPAC as most of the textbooks were in the short loan collection. The students concentrated more on the prescribed and recommended textbooks and on the references given to them by the lecturers.

2.4 PROBLEM-BASED LEARNING AND MEDICAL LIBRARIES

The effect of PBL on the libraries was felt a long time ago. However, there has been very little documentation in this regard in the past. Today there is an emerging volume of literature on problem-based learning and the health sciences libraries, the role of the librarians and the information management and the information seeking behaviour of the

health professionals. A number of surveys have been conducted in the medical schools in the United States with regards to the information gathering habits of undergraduate medical students, informal meeting of medical librarians to explore the common elements among libraries serving the needs of a problem-based learning curriculum, the impact problem-based learning has on the use of the medical libraries. According to Watkins (1993) the librarians were facing new challenges and opportunities in the problem-based learning environment compared to that of the traditional curriculum. Although the subjects in the problem-based learning curriculum are the same as the Traditional Curriculum, there are additional educational aims, which directly affect the provision of library services.

As discussed by Saunders, Northup and Mennin (1985: 75), a study carried out at the University of New Mexico, USA, on students in the problem-based learning curriculum showed that these students spent more time in their library compared to their counterparts in the traditional curriculum, used a greater variety of resources which they selected themselves more often than not. The results of the study of four medical schools in the United States confirmed the assumptions that problem-based learning students used the library more frequently. Together with this the students acquired information seeking skills earlier in their medical education, chose information resources typical of the independent learner. They also located their resources with more ease and confidence.

A key question for librarians and medical schools who intend changing the curriculum to PBL, is whether the students and the faculty involved in the PBL curriculum will use the

library and its information resources any differently from the students and academics in the traditional curriculum. (Marshall et al., 1993). Their study of users who did their own Medline searches, of library use habits, and library circulation data revealed that a greater proportion of medical students in the PBL curriculum use the library more than frequently and for longer periods than do the students in the traditional curriculum.

"PBL medical programmes usually employ three primary principles which are basic sciences learnt in the process of problem-solving cases, learning is motivated by student curiosity and self-directed leaning and small group tutorial sessions which are center of learning where the role of the lecturer becomes one of facilitator and guide." (Barrows, 1996, p 5-6). To complete the cases that the students analyse and the learning goals determined, they reach a point where additional information is required for the follow up tutorial. The students either work independently or in small groups to find answers to the cases with which they are presented. Norman and Schmidt (1992) indicate that the acceptance and growing application of PBL presents important challenges for all involved in the curriculum.

2.5 SUMMARY

PBL was originally developed for medical school students with a set of relevant real-life medical problems, which they were expected to analyze. The success of PBL depends on finding actual medical situations. Students in the problem-based curriculum react to problems that relate to their own lives and experiences as opposed to students in the traditional curriculum were taught and handed out notes and references for information.

Successful problem-based learning offers extensive educational flexibility. Teachers and students are involved in a process of ‘finding out’ together where much of the benefit of PBL depends on an open discussion between them. The teacher is now the facilitator or guide, a role which may be a little difficult or uncomfortable to adapt to initially. It may be a very thorny situation where the teacher is expected to be quiet and listen and not to teach or contribute.

PBL can be ideal for teaching Information Literacy because it is designed to create the impression of real-life information needs and a process of finding solutions to problems encountered. The very nature of the PBL curriculum, with its emphasis on self-directed learning, has a major impact on the Library, its resources and the Librarians.

CHAPTER 3

THEORY: INFORMATION LITERACY

3.1 INTRODUCTION

Information Literacy is a set of skills required to find, retrieve, analyze and use information. The American Library Association Presidential Committee on Information Literacy (1989) said that ultimately literate people are those who have learned how to learn because they know how knowledge is organized, how to retrieve information and eventually how to use the information retrieved so that other can learn from them. They are prepared and have acquired the lifelong learning skills and are able to find information needed at any time for any task.

Information Literacy equips the students with the critical skills necessary to become independent lifelong learners. The American Library Association adds that Information Literacy skills may be introduced to the students but a corresponding curriculum in Information Literacy is needed to form a strong foundation of tertiary education. It is a term that is increasingly becoming more and more important globally. There is the growing sense that the increase in computer-based resources and instruction in some way has changed the nature of experience of undergraduate students at tertiary institutions.

One of the fundamental principles underlying PBL is the process of analyzing typical cases where learning is stimulated by student curiosity. To analyze a case the student always comes to a point where questions are asked, which then becomes learning goals and more information is needed to continue the learning process (Donner, Bickley, 1993).

In order to fulfill the need for more information it becomes necessary for the student to be able to find the information. The student needs to acquire the skills and techniques to become information literate and critical thinkers so that they can evaluate the information they locate.

3.2 VARIOUS THEORIES ON INFORMATION LITERACY

In the past, librarians were perceived as bespectacled women with buns on their heads who sat behind an issue desk counter and stamped books all day long. The feeling was that the librarians' attitudes toward their profession would affect the quality and amount of support that they received from their library patrons. The importance and value of librarians depend on how the library users perceive them, which in turn determines and influences the attitude and behaviour of these users. Presently, in information society, librarians have a chance to promote themselves as disseminators of information and information consultants, in addition to guardians of books and journals and specialists in bibliographic searching (Blackwelder, Dimitroff, 1996). They elaborate by reporting on a study that was done by Schuman in 1990 who said that the critical problem is not how the librarians look but that there is a lack of awareness of what the librarians do.

Different authors use the related terms like information competency, computer literacy, library literacy, media literacy, network or Internet literacy and digital literacy to define and emphasize the various aspects of the concept of Information Literacy (Webber, Johnston, 2000). Information Literacy is the ability to locate, evaluate, manage and use information from a range of sources for problem solving, decision-making and research.

The change in the health information environment and the need for changes accordingly within the health sciences libraries and librarians is a continuous theme throughout the literature of the library profession Bradley (1996). He continues to say that to think about the changing needs of health information, it is necessary to explain what "health information" is. Buckland (1991) identifies information as, "information as a process", "information as knowledge", and "information as thing". Information as a process refers to the action of being informed and in so doing adds to an individual's existing knowledge. Buckland highlights information as an intangible, unspecified element when he refers to information as knowledge. Finally when he refers to information as thing, he is referring to the concrete representation of information as knowledge where information becomes the evidence within a particular context.

As health sciences librarians we focus on two primary concepts of information. The first is that of the printed information that is published and distributed and the second is the electronic media, which is the surrogate for the printed, published resources. The health sciences librarians, also known as the health information professionals, all talk about "information", "information literacy", "information needs", "information technology", and "information management" using the same word but mean different things. Expert information work is changing rapidly, established tasks are changing or disappearing altogether and new tasks are emerging. Watkins (1993) says that some of the librarians teach information-seeking skills in the formal tutorial sessions as a result that one of the librarians at McMaster University became a formal tutor.

According to Wildermuth, de Bliek and Friedman (1994) says that when faced with a problem, a person may be able to solve it using his or her knowledge of the sphere of influence or may need additional information from an outside source. The students will ask many questions and the external source that they use may be any resources that are available which includes the librarians. They go on to add that as the design and provision of information systems becomes more user-centred, it is evident that the librarians need to understand their needs. In order to understand the needs of the student at the Medical School, there has to be some cooperation between the librarians and the School of Undergraduate Medicine who plans and coordinates the undergraduate curriculum. Fuller, Ketchell, Tarczy-Hornoch and Masuda (1999) state that librarians must become even more active participants in the day-to-day delivery of information.

To ensure that health information professionals remain crucial in today's changing environment, they must continually reposition themselves to succeed in their new surroundings. This is especially apparent at the Nelson R. Mandela School of Medicine. It is very noticeable that the needs of the students in the problem-based learning curriculum differs from those of the students in the lecture based, didactic curriculum. The trend towards problem-based learning means that the information literacy programmes must change to meet the increasing information demands of the students. Rankin (1992) concluded that the problem-based learning students used the library more frequently and supported the independent learning process than did the students in the traditional curriculum. The sooner the students acquire the information literacy skills in their medical school education, the more effective the physician's independent learning

skills. Another study done by Marshall, Fitzgerald, Bushby and Heaton (1993) also found that the students in the problem-based curriculum used the library more than the students in the traditional curriculum. They found that the students acquired information seeking skills either prior to enrolment at medical school or in their first year of study.

Librarians are teaching in educational institutions worldwide. Literature in English on Information Literacy programmes in academic libraries indexed in the databases ERIC and Library Literature from 1901 – 2000 reveals that library instruction programmes are evident in Asia, Oceania, South America, Africa and Europe except North America. (Lorenzen, 2004). The instructional librarians and the students at the University of Hong Kong found the Information Literacy programmes to be very successful. The academic librarians were in the forefront in teaching the students how to search the Internet effectively. (Morgan 1980).

Teaching Information Literacy to the so called ‘disadvantaged students’ at the Medical School is a problem because English is not the first language of these students. Although the students do understand and speak English, the librarian may be teaching and talking at a pace that may be ‘too fast’ for the disadvantaged students to understand and retain some, if not most of what is being taught. A research study was conducted on how information literacy could be difficult to teach the ethnic Maori group in New Zealand who did not understand either libraries or the educational system and this made it very difficult for the librarians to teach them (the Maori) information literacy skills. However, this may not be the situation today with the progress in education and the upliftment of

the people. Nevertheless, language may be a problem in the case of the disadvantaged students at the Medical School whose first language may not be English. Information is stored in memory in meaningful, dynamic structures and adding new information to a meaningful structure results in a richer structure.

The impact of information technologies in academic libraries have been remarkable in almost all the developed countries where the infrastructure is in place to provide the efficient service that the libraries are proud to present. About fifteen years ago, Fjallbrant (1990) looked at the impact of online databases, optical storage devices, electronic publishing and e-mail with regards to how these technologies were impacting library user education.

Bruce (1997) describes information literacy as the ability to locate, manage and use information effectively for a number of purposes like effective decision-making, problem solving and research. She recognises seven different categories that educators in higher education experience and understand information literacy, which are using information technology, finding information, recognising the need for information and using the information to meet the needs, controlling information, building up a personal knowledge base, working with the knowledge acquired to gain new insights and using the information wisely so that others can benefit. Although the students at the Medical School come from different backgrounds and different levels of understanding therefore effective action, problem solving and decision-making will vary from one student to the next so long as the skills to perform effective searches are acquired.

It is the general belief that students in the problem-based learning curriculum and the traditional curriculum should have different conceptions of lifelong learning. A study by McGowen (1995) showed that there was no difference in lifelong learning between the students in the problem-based learning curriculum and the traditional curriculum. Minchow (1995) emphasizes the importance of incorporating skills in information literacy into the regular stream of courses in the curriculum. He elaborates that students' attitudes towards information literacy were positive and their skills in locating information improved significantly.

The term, 'data smog', introduced by Shenk (1997) refers to the idea that too much information may build an obstruction in our lives. The data smog is created by the amount of information available, the speed at which it is produced, the need to make quick decisions for the information that is needed. The students are inundated with amount of information they retrieve especially on the Internet and they are not quite sure which information is relevant. Information Literacy is the solution to data smog because it allows the students to acquire the skills like critical thinking and technological skills to filter their searches. It also includes the technological skills required to use the Library as a gateway to information.

3.3 THE IMPORTANCE OF INFORMATION LITERACY

There is a need to develop students' abilities to deal with the exponential growth and complexity of information which they have to handle especially in higher education. Educators in all sectors need to work together to ensure that the students graduating from

institutions of higher education can recognise and solve information problems and can learn from information resources. (Bruce, 1995). In information literacy education, the practices of learning about information and from information are both important as resources and technologies are fast becoming outdated. The students need to learn about the world of information including how to learn from it and how to use it. Information literacy cannot be taught in isolation. The ideal is that the strategies employed in information literacy should assist the students to learn discipline content in conjunction with information literacy.

The students need to:

- use the Information Literacy skills to retrieve information in order to satisfy the knowledge required for the discipline;
- to identify the correct learning resources from the library;
- learn to use the relevant information resources relevant to the cases or problems effectively and efficiently;
- learn to solve information problems in order to retrieve relevant information;
- learn to access a variety of tools to access information;
- develop the ability to design their own search strategies to gather the information;
- learn how to critically evaluate information for relevancy;
- develop the ability to transfer the principles and strategies of accessing, using and managing information from one case or problem to another.

Some of the characteristics of an information literate individual as concluded in the information competency standards for higher education of the Association of College & Research Libraries (2000) are that the individual is able to determine the extent of the information needed, access the information effectively and efficiently, critically evaluate the information, add the information into one's own knowledge base, and importantly to understand the legal issues of using the information. Bruce (2002) says that Information Literacy is understandably the basis of learning in the present environment of constant technological changes. Educators see the need for learners to engage with the information environment as part of their formal learning processes as information and technological explosion continue. Information is seen as the focus of lifelong learning to achieve personal empowerment.

3.4 LIBRARIAN AS AN EDUCATOR

The role of the librarian shifted from being purely one who ensured that the library was adequately stocked with books and journals to meet the needs of the students to that of provider of an efficient service. This role has changed to that of teacher and educator with the rapidly increase in volume of material, that is books, journals, the literature databases published in the electronic format and the Internet. The Internet, as opposed to the academic online literature databases, has added to the changing role of the librarian in that not all the information available on the Internet is relevant to academia and the librarian has to teach the users to critically evaluate the websites. Nwoye and Anafulu (1973) wrote that the librarians taught the students the required course on library skills, which was a part of the general curriculum at the University of Nigeria.

Appleton (2005) claims that both the library and academic staff can develop information skills for health studies curricula in higher education collaboratively. This can have very encouraging and positive effects on both student perceptions and experiences including standards of teaching and learning. In the past the library was there to provide the reading material for the students and academics. Prior to 2001 the students in the traditional curriculum purchased their own textbooks and they used the library to supplement their reading as they were given notes and handouts at the lectures. Apart from teaching the students, the academic staff also did a tremendous amount of research for which they used the library. The main interests of the students were the books and the researchers and academics main interest were the journals for the very latest and current information. With the introduction of Curriculum 2001 the students were expected to spend their so-called "free time" in the library locating information effectively and efficiently themselves. Initially the librarians worked in collaboration with the School of Undergraduate Medicine to determine the needs of the students in terms of reading material. This collaboration 'disappeared' along the way.

The electronic media has made so much of information available that the librarian's role has changed from one of just providing the information to that of *teaching* the students how to access and assess the material they retrieve. The students are not reliant on textbooks alone but are encouraged to refer to journal articles as well. In order for them to be able to retrieve the journal articles they have to develop the necessary information retrieval skills. This is the task of the librarian who *teaches* the students the techniques in searching the databases and the Internet for relevant information.

The librarians teach the students how to and why they need to evaluate information on the Internet and the criteria that may be used to evaluate this information when using any of the search engines like Google and Yahoo. Some of the main criteria used to evaluate the websites using the search engines of their choice are:

- Accuracy: the students have to look at the information carefully to see if it is factual; that the graphs, tables, diagrams are clearly labeled and that the information is reliable;
- Authority: The students have to ask the questions, Who is responsible for the information? What are the author's qualifications, the copyright of the information? Is there a conflict of interest? The value of the information**.** They also have to look at the legitimacy of the sponsors, if there are any;
- Coverage: Is the page complete? Is there a print equivalent?
- Currency: The students have to look at the dates, graphs, current links of the information;
- Objectivity: The students must be aware and alert to the fact that the author is not biased in his / her writing, that there is no conflict of interest and that there are no adverts in the information.

The students are also taught that they should look out for accredited sources in the addresses when they search the Internet. They must be aware of the '.com' sites and read these articles critically and apply the criteria for evaluation. The credible sites to look out for are the '.gov'; academic and educational sites namely universities and colleges; medical sites of hospitals and national and international medical schools.

Asher (2003) expands Appleton's statement further by adding that the librarians and academics provide separate, interdependent instruction, both of which have intrinsic value. This is so true because the librarian is an expert in the field of providing the information and teaching and assisting the students to acquire the necessary information retrieval skills using specific keywords in order to retrieve relevant information. The academics teach the students and provide them with the actual and factual information and skills to become doctors. The academics and the librarians complement each other where both teach the students to acquire life-long skills which they will use throughout their career.

In the traditional curriculum at the Medical School, the students attended lectures and consulted their textbooks for additional knowledge and information. Like the students in the Traditional Curriculum, the students in the problem-based learning curriculum also consult the library and the librarians for additional information when the need arises. However, the difference between the students in the two curricula is that the students in the traditional curriculum relied almost totally on their textbooks whilst the students in the problem-based learning curriculum use the recommended textbooks heavily but they are also using the literature databases and the Internet to retrieve and locate additional information. The Librarians have to *teach* the students in the problem-based learning curriculum the techniques and skills on how to access relevant information electronically as opposed to demonstration, a show and tell session, with the students in the traditional curriculum.

When searching the literature databases to which the Library subscribes, the students are taught how to use the Boolean operators before they are taught how to perform a search. Knowledge of the Boolean operators as searching techniques is important for the undergraduate students to be successful in formulating a search strategy either for searches on the Internet or the literature databases. The objectives of teaching the students to understand the use of the Boolean operators successfully are that they will learn:

- the importance of narrowing their searches by combining relevant keywords and terminology;
- how to use the "AND" operator to narrow a search whereby two different keywords;
- how to use the "OR" operator to expand a search;
- how to use the "NOT" operator to exclude a term from a search
- that although the interfaces of the databases are all different, the principle and application of Boolean searching is the same in all of them.

The "AND" operator allows student to retrieve articles that have common keywords, for example HIV and Children where the topic is Children with HIV. The "OR" operator brings together two or more search terms that have the same meaning into one set, for example AIDS and Acquired Immunodeficiency Syndrome where both the terms mean the same thing. In order to use the "OR" operator effectively, the students should bring together all the like terms and keywords that they would have to use when performing a

literature search on one of the databases. The “NOT” operator excludes a search term, for example HIV in children and NOT adults.

The students need to think about what they are looking for, what keywords should they use, and how can they narrow down their search which will result in a better search and it will also help them save time. To begin with the students have to analyse the topic in question so that they are able to formulate a search strategy using keywords and terms that they consider as important. In addition to the keywords that the students may use, the literature databases have a built in thesaurus, which when ticked, will search the databases for similar, alternate terms. This is an opportunity to emphasize how important it is to narrow down a search.

The main aim of the Medical Librarian, as educator, is to ensure that the students acquire the lifelong learning skills of using the Boolean operators, AND, OR, NOT; analyzing their topics and creating a search strategy using specific keywords and terms and alternatives, if necessary, relevant to perform a successful and meaningful literature search irrespective of which databases they may use including the internet.

Lorenzen (2004) in his paper describes the four stages of Perry’s Scheme of Student Development which the students go through in their critical thinking skills as:

- dualism where the students are of the opinion that all the questions have a definite right or wrong answer;

- multiplicity where the students believe that there are a number of answers to a question;
- contextual relativism where the students realise that opinions have to be validated;
- dialectic when the students are able to view problems from more than one viewpoint and recognise that the best answers to the questions will depend on the way the questions are asked.

Lorenzen goes on to say that although most of the students fall in the first two categories of student development, most of them weight all the opinions on the same level. They have not yet developed the ability to form their own opinion of the best answer to a question. Problem-based learning lends a different slant to this theory because the students are expected to search for the answers to questions and problems posed at their tutorials. The students have to consult the resources available in the library in order to satisfy these questions and problems. Some students may work in groups to find the information whilst others may work individually. In both these cases the students are looking for answers to the questions. The Librarian is constantly assisting the students whether they come in small groups and / or individually for instruction on how to access the information.

Information Literacy, sometimes referred to as information competency, is the ability to access, assess, organise and use information from a number of sources. To be information literate one has know how to clearly define a subject, select the appropriate search terms or terminology, to formulate a search strategy and the various ways in which that

information is organised. To turn this information into knowledge one must be able to look relevancy, quality and value of the retrieved material, which involves deeper understanding of how and where to find the information. Finally one has to assess and evaluate how best the information can be used to address the problem at hand. Problem-based learning encourages the students to be able to access, evaluate and use the use the information. The librarian facilitates the link between the student and the information in its various forms. As early as 1973, Durey highlighted the need for teaching function of the university library in the collection of material which it holds and the kind of service that it offers the undergraduate students.

With the introduction of Curriculum 2001 the students no longer did their 1st year at the Howard College Campus. They started with their 1st year at Medical School and a complete orientation to Curriculum 2001, which included the library orientation and information literacy was scheduled for the 1st three weeks of the first term. My role as the health sciences librarian, responsible for user education and information literacy, changed. I was now more involved with the students and had more time to teach them how to use OPAC in small groups. Further teaching on Information Literacy was done as the need arose. I think that teaching the students relevant skills, with particular reference to information retrieval, when they need it has a more lasting effect on them. They were able to retain and remember what I taught them with specific reference to the techniques in searching databases, evaluating websites, the referencing techniques when the need arose. They were also in a position to use the resources effectively themselves at a later

stage. There was always more participation from the small groups as these were more interactive, hands-on teaching sessions.

Alleyne (1996) confirms that information is one of the most powerful instruments of change known to man. No persons should be hampered in their ability to make decisions about health matters because they did not have access to information that librarians have at their disposal. What Alleyne is saying is absolutely true in that the resources are at the librarian's disposal BUT the students have to learn how to use these resources in order to be able to retrieve this vast bank of information. Therefore it is the task of the librarian to teach the students the skills required to access these resources. In the beginning the students should be taught the very basic skills and as they progress into their senior years and the need for more detailed information increases, they should be taught the more advanced skills in information retrieval. The Kolb learning cycle of planning, implementing, evaluating and reflecting is a practical model for us librarians to use in our preparation of the information literacy programmes that we plan every year for the students. By following Kolb's learning cycle, we can fill the gaps and improve our programmes.

Medical information and knowledge is packaged differently as there is always cutting edge research which is new knowledge on an ongoing basis. Across the world, librarians have been developing strategies and policies for planning learning opportunities that will enable the students to take advantage of the information infrastructures available to them. Learning opportunities that enhance Information Literacy not only make use of

information effectively and efficiently but are designed to bring information practices into the curriculum. Opportunities like this set the scene for the students to experience the influence and value of good, sound information practices.

3.5 KOLB LEARNING CYCLE AND INFORMATION LITERACY

The Kolb learning cycle refers to the process by which individuals and teams attend to and understand their experiences and through this, on reflection, modify their behaviour. One of the main reasons for failure is that the individuals make mistakes repeatedly. They probably do not realise that they are the same mistakes all the time and are unable to change or that they refuse to acknowledge that they are wrong and rectify their mistakes. The learning cycle teaches us that the more often we reflect on what we do, the more often we have the opportunity to modify and change our efforts.

The four elements which constitute Kolb's model of experiential learning are:

- Planning assists us with new understanding and we can predict what is likely to happen next, what actions should we take to change or modify or refine the way we handle a task
- Implementing or Experiencing is the stage at which the individual, team or organisation is assigned a task and carries it out. They are not usually reflecting on the task at this time but they carry out the task with the intention of learning
- Evaluation or Conceptualisation involves the interpreting of events or the tasks that were carried out and the understanding of the relationship among them. It is at this stage that theory may be particularly helpful as a framework to find

answers, make generalisations, draw conclusions and form hypotheses about the experiences

- Reflection and Re-planning is the reviewing process of what has taken place and the experiences the individual, team or organisation has encountered. The skill of noticing the differences helps to communicate it to others. One's values, attitudes and beliefs influences whether one can differentiate certain events.

The learning process generally begins when an individual carries out a specific action and then sees the effect of the action in the situation. The students use the following process when performing a literature search using Kolb's cycle of experiential learning:

Planning – the students will look at the topics, whether they be research or for their tutorials and plan how they will go about performing their literature search, what databases and other available resources are they going to use. They will analyse and understand the topics they are researching and select keywords that they will use in their literature search.

Implementing or Experiencing – the students will perform their literature search using the selected keywords or subjects. The databases allow a vast cross section of searching using as many keywords, authors names and subject headings and all these may be combined using the Boolean operators, and, or and not.

Evaluation or Conceptualisation - the search will retrieve some references that may be of interest to the students who may now be able to find the articles. By interpreting the details of the references retrieved, namely that of the author's

name(s), title of the journal article and the title of the journal, the volume number, year and page numbers, the student must confirm that the Medical Library has this journal.

Reflection and Re-planning – the student is able to locate and retrieve the journal either from the shelf or the Library homepage if it is available in the Medical Library. If the references that were retrieved from the literature search is not what the student wants, then he / she will have to start the process from the beginning, look for alternative keywords and perform the literature again.

Kolb involves the different forms of knowledge as a result of having an experience and transforming it into cognition. In the case of the students, they acquire the knowledge on how to search the databases and then they learn how to search the databases themselves to find the resources. The students acquire the necessary life long learning skills and techniques that will help them throughout their lives. If one is equipped with these skills and techniques, one can go anywhere in the world and use the same skills and techniques to locate or access resources. The principle of searching remains exactly the same, the only difference may be the various databases that may be used. When reflection on learning to be information literate is merged together with the experience of Information Literacy, students are assisted to recognise and realise that these processes are a part of every day life.

3.6 SUMMARY

The constant changes in the health information environment has led to the development of Information Literacy programmes to help increase the literacy levels of all health care consumers. Librarians need to ascertain the literacy levels of the students so that they can provide the necessary training to enable the students acquire and use the information seeking skills and techniques as and when required. Information Literacy education is the medium required to change the information society of the present into the learning society of the future.

The undergraduate students are not in a position to use all the databases to which the Library subscribes. Some of the databases contain in depth information of a very high level of understanding and research and are more suited to the academics, postgraduate students and researchers whilst there are certain databases, like MD Consult and e-Medicine, that are more suited to PBL and the undergraduate students. Curriculum 2001 offers a challenging opportunity to the Librarians to teach and train the undergraduate students in the information-seeking process as a fundamental aspect of undergraduate medical education.

CHAPTER 4

METHODOLOGY AND METHODS

4.1 RESEARCH METHODOLOGY

4.1.1 INTRODUCTION

The study consists of quantitative data, like book loan statistics from the Short Loan Collection and the general / open shelves and the tattle tape statistics which may indicate the pattern of use in the Medical Library with the introduction of Curriculum 2001. The qualitative study concentrates on the attitudes of undergraduate students, both from the traditional curriculum and Curriculum 2001, toward information literacy and their information seeking behaviour, the perceptions of the facilitators and the librarians.

Dodd (2007: 208) says that throughout the literature describing studies conducted in PBL libraries, both quantitative and qualitative methods have been used to collect data which is a reflection of the role and functions of the library and the librarians.

The purpose of this study is to identify:

- the library usage, information retrieval habits and the resources used by the undergraduate students in the traditional curriculum (5^{th} year students) and Curriculum 2001 (2^{nd} year students);
- the perceptions of the librarians regarding their roles in the library after the implementation of Curriculum 2001;
- the perceptions of the facilitators, all of whom also lectured in the traditional curriculum, of the role of the librarians and the library after the implementation of Curriculum 2001.

This study also includes action research whereby the evaluation and analysis of the quantitative and qualitative studies influence or improve the current environment.

4.1.2 QUANTITATIVE RESEARCH

Quantitative measurement involves the assigning of numbers to objects to represent how much the object has of a particular feature. The book loan statistics and the tattle tape figures are tangible figures. The loan statistics of books and unbound journals create a picture of usage of the library's resources.

4.1.2.1 Books and Journals

All the books and bound journals from the open shelves are charged (issued) and discharged (returned) at the Issue Desk whilst the 3 day loan and 2 hour loan books are issued in the Reserved Book Room (RBR) but are returned at the Issue Desk. The Medical Library gets a printout of the statistics of all the books and journals for category issued at the end of every month. The unbound journals are issued out manually for which the statistics are recorded daily on a statistics form designed by the Circulation Librarian. The statistics are added together at the end of each month. The Circulation Librarian is a professional librarian who supervises and ensures that the Circulation section, that is the Issue Desk and the RBR where the books, journals and electronic media are issued and returned, is run efficiently. According to Fosmire and Macklin (2005) there is a shift in the emphasis from teaching to learning and inputs to outputs in higher education. Therefore the assumption is that the students should use the library's resources, print and electronic, to read more widely to gather additional information surrounding the problem as PBL expects them to do. The statistics in Chapter 5, Data

analysis, indicates that there was an increase for the 1st 3 years and then it decreased in the 4th year after the introduction of Curriculum 2001. Due to the amount of library material and the number of books and journals loaned out, the library may decide that it requires more space to accommodate its users and additional staff to provide a more efficient and effective service. It could also indicate that the librarians have to be more proactive to go out and draw the users to the library to teach them how to use the electronic resources to access the latest information. Fosmire and Macklin (2005) add that it is a constant struggle for the librarians to convince faculty and students that information skills are important and need by the students. PBL advocates that self-directed study and independent learning whereby students are expected to gather relevant information themselves. Therefore PBL has an influence on the role and functions of the library and the librarians in that it opens doors for them to become more involved in the curriculum as providers and not just repositories of information, to teach the students how to access information using the electronic resources like e- journals and databases, to use the table of contents and indices of a book to find information and the skills and techniques involved in critically evaluating websites on the Internet instead of using the Wikipedia, a quick fix to answer any question or problem. The students are responsible for their own learning.

4.1.2.2 Tattle Tape statistics

The Tattle Tape statistics are a quantitative measurement of the number of library users leaving the Medical Library. The Tattle Tape machine is situated at the exit of the Medical Library. An electronic device in the Tattle Tape machine executes the counting

whereby the figures are solely that of patrons who exit the Medical Library. The statistics are recorded manually on a statistics form, designed by the Circulation Librarian, at the end of every working day. The total is calculated at the end of each month. The students and staff may come into the Medical Library several times during the course of the day and the machine will count the same person as many times as (s)he exits the Library. Therefore the daily or monthly figures may be fairly high and may be misinterpreted as to how busy the Medical Library is when it may not really be so. It may also be assumed that the users are borrowing library material or reading in the library. This type of quantitative research lends itself to predictive validity.

4.1.3 QUALITATIVE RESEARCH

Qualitative research aims to provide an in depth understanding of people's experiences, perspectives and histories related to their personal setting or environment. (Spencer, Ritchie, Lewis & Dillon, 2003). One of the main characteristics of a qualitative study is that the perspectives of those being studied are explored. Qualitative researchers study meaningful actions of people, actions with a purpose not just what they observe from the outside and what action means to people who perform them. One of the main characteristics of a qualitative study is that the perspectives of those being studied are explored. Qualitative research may employ various methods, which may include interviews, questionnaires, observation, documents, focus groups, video analysis, conversations, narratives and more.

The questionnaires used in this study were analysed qualitatively using the EPI Info software to determine the attitude of the students towards the library and their information retrieval habits. EPI Info is a software tool used to customize data and enter and analyze data statistically. The questions were kept short and simple for the following reasons:

- to avoid ambiguity and misinterpretations in understanding them (the questions);
- respondents are often unwilling to read long questions in order to answer them;
- to answer self administered questions the respondents should be able to read them quickly, understand the intent and select an answer without much difficulty;
- to ensure that the questionnaires were returned in good time.

There were no open-ended questions in the questionnaire. Fifty percent of the questions had at least three choices from which the respondents could choose and the remaining fifty percent required a choice between a “yes” or “no” answer. The respondents were expected to circle the answers that applied to them. They could select more than one choice to some of the questions if it applied to them. All the variables in the questionnaire were cross tabulated which compare the responses of the students to the questions. The facts gained from the qualitative data extracted from the questionnaires demonstrated the reasons why the students use of the library (Appendix 1).

Qualitative research can be conducted in many ways some of which are participant observation, field research, interviews, and videotapes. I have used the interpretive approach to my research by interviewing the facilitators who were also theme

coordinators, doctors and researchers and medical librarians to determine the impact of PBL on each of the said group of people.

The change in the curriculum at the Medical School involves a large number of role players responsible for teaching the students. One of the role players is the Medical Library, the "heart" of the Medical School, including the Librarians. Apart from providing the necessary resources, one of the main functions of the Librarians is to teach the students to acquire the necessary, lifelong learning skills on information retrieval so that they can work independently. The School of Undergraduate Medicate (SUME), responsible for the design of Curriculum 2001, liaises with the Medical Library to organize and run some of these training sessions on access to the library's resources both print and electronic.

The semi-structured interviews in this study allowed the researcher the flexibility to use a set of questions which lent themselves to varying the sub questions according to the interviewees (Appendix 2). To illustrate this statement, the seniority and maturity of the facilitators varied from very senior academic staff to postgraduate students. There was a noticeable difference in the answers to the questions asked. This lent itself to the qualitative analysis of the data collected and the semi-structured interviews using the NVivo coding software where the responses to each question by the interviewees were coded into common categories or terms known as nodes. Qualitative research is normally carried out in the natural setting with no outside influences by the researcher. The data in a qualitative research is full of thorough description of what people said, described their actions and their interaction with others.

The raw data was categorized using the NVivo Software for coding common comments that emerged from the interviews. Interpreting one's findings is the final step in the research process because existing practices may or may not be supported, new techniques which may be more effective may be introduced. The NVivo coding allows the researcher to look at the responses of the interviews critically, select common categories or nodes so that they could be classified. The researcher was looking for distinct trends, attitudes and perceptions among the facilitators and librarians in respect to their particular responsibilities. The nodes were further categorized into trees.

The CDTF minutes also refer to study guides and bibliographies which the lecturers, facilitators and the School of Undergraduate Medicine (SUME) may decide to make available for the students in the library. However, permission from the University copyright officer must be granted prior to any reading material that is photocopied or reproduced in any form to be kept in the library for student use. The Medical Librarians also do some research into locating relevant reading material by searching the databases for journal articles, books that are available in the library and Internet sites that will be very useful to the students. This additional reading material is made available for the students on the Library's WebCT module. WebCT is a communication platform between the students and the teacher which the students can access either at university or from home. Although it was possible to assess the access to WebCT, no records were kept.

This study has encompassed all the above-mentioned approaches in order to assess the need for change and to improve the information literacy skills necessary to retrieve

relevant information by both the students and the facilitators especially after the introduction of problem-based learning.

4.1.4 CASE STUDY

Case studies involve investigations of particular individuals who could contribute towards a research project. They are generally descriptive and provide longitudinal information about individuals or particular situations. This type of research allows for new ideas that may emerge as a result of careful and detailed observation. According to Benbasat, Goldstein and Mead (1987: 369) case study research is particularly appropriate for certain types of problems where the experiences of individuals are important and the circumstances of action is critical. Some of the reasons that a case study is feasible are:

- the researcher can study the subjects and problems in its natural setting;
- that the researcher can answer the "how and "why" questions to understand the nature and the complexity of the processes taking place;
- It provides a systematic method of collecting data, analyzing data and reporting the results.

This research project uses case study as a research strategy because it lends itself to collecting data from documents, interviews, direct observation which the researcher has used. However, case studies can have its limitations especially in respect of the validity of information as it is difficult to test.

4.1.5 ETHNOGRAPHIC RESEARCH

According to van Maanen (1996), ethnography, when used as a method, refers to fieldwork or participant observation conducted by one or many researchers. Ethnography relies on close-up, personal experience and possible participation, not solely on observation, by researchers but also on interviews and documents. The roots of ethnography lie in the fields of anthropology and sociology. However, present day researchers conduct ethnographic research in organizations and communities of all kinds, including public health, consumers and consumer goods and any human activity. Through their findings, ethnographers may attempt to influence others on policy decisions from such an analysis. Ethnography, a method of research, seeks to answer questions concerning the ways of life of human beings. In order to answer their research questions and to gather information, ethnographers often live among the people they are studying. The researcher, being a librarian interacts with the students and fellow Medical Librarians daily as opposed to interacting with the facilitators when they visit the library and / or when they require assistance with performing literature searches or to locate material in the library.

The ethnographic research, in this study, involved the participants that are the students, facilitators and Medical Librarians. The researcher observed the studying behaviour of the students in the library, the needs of the facilitators either telephonically or personally when they visited the library and the attitude of the Medical Librarians towards the students especially with regard to the assistance given to them to achieve their goals in leaning how to retrieve relevant information effectively and efficiently. The information

literacy programmes discussed at the Medical Librarians meetings held every 2-3 months. Information literacy programmes is used in the pleural as each Medical Librarian uses his / her own approach to teaching the students on how to access the library's resources. The teaching sessions vary according to the responses of the students in the class.

Ethnographic research leads on to the hermeneutic approach to research as all the data collected in the research has to be interpreted and analyzed. Like ethnography, hermeneutics, today, also include interaction among people including casual conversation and in this study people refers to the students, facilitators and Medical Librarians involved in the research.

4.2 METHOD

4.2.1 Introduction

The present study was conducted over a period of one year.. The basic design of the study consisted of questionnaires for the undergraduate students, separate semi-structured interviews for the facilitators and librarians, minutes of the Curriculum Development Task force, the Tattle Tape statistics in the Medical Library and the number of library items, both books and journals, loaned to the undergraduate students in both curricula.

4.2.2 Study Sample

In this study the researcher collected data from the following to determine whether there were any changes in the different role players with regard to their use of the library and the demand made on the Medical Librarians:

- questionnaires to the 2nd and 5th year undergraduate students from the traditional and Curriculum 2001 respectively;
- semi-structured interviews with the facilitators who were also Theme Coordinators, Medical Practitioners and Researchers; and
- semi-structured interviews with the Medical Librarians.

The researcher selected the students randomly from the class lists of both the 2nd and 5th year students. The 2nd year tutorial class list, Curriculum 2001, for Theme 2.4 was obtained from the School of Undergraduate Medical Education (SUME) which was used to select 20 students. There were 19 tutorial groups and each group had 11 students. The names of the students ran from A-Z in alphabetical order within each group. The odd number from each group, starting with number 1 from Group 1; number 3 from Group 2; number 5 from Group 3 and so on from each subsequent group. As there was one student short at the end, the researcher selected the last number, which was number 11 from Group 19 to make up the 20 students. There were 209 students in total.

The class list for the 5th year students, traditional curriculum, obtained from the Undergraduate Office was in alphabetical order from A-Z and there were 172 students in total. The researcher selected every 9th student on the list and was one short for 20 at the

end. To be objective, the researcher divided the total number of students, which is 172 by 2 and used the 86th student on the list to obtain the 20th student.

The researcher had to get the consent of all the students who were selected prior to handing out the questionnaires to them. Both groups of students were given 3 weeks in which to answer and return the questionnaires to the researcher. Informed consent is a process whereby the participant in informed about the facts of a research project so that s/he can decide whether to participate or not. It involves signing a written contract that indicates the willingness of the participant to contribute towards the research project.

As the 5th year students in the traditional curriculum were out on their clinical blocks to the surrounding hospitals, they only came to Medical School at the end of the blocks for assessment. The blocks refer to the six major disciplines into which the curriculum is divided. The researcher had difficulty in getting 20% of the 5th year students for the survey as most of the students either travelled from home to the hospitals or used the transport provided by the Medical School which left the premises very early in the morning and returned very late in the afternoon. It was not possible to get more than 20 students for the survey. After the selection of the students as described earlier, the 20 students whom the researcher contacted consented to participate in the survey. Therefore an equal number of 20 students were selected form the 2nd year class of Curriculum 2001.

The facilitators were selected upon availability, a convenient sample, and were representative from the different disciplines at Medical School as far as possible. They

were from the Departments of Forensic Medicine, Microbiology, Obstetrics and Gynaecology, Optics and Imaging, Paediatrics, Pharmacology, Physiology, Skills Lab, SUME and Virology. At this stage facilitators from the Departments of Anaesthetics, Medicine and Surgery were unavailable due to time constraints**.**

The demographic representation of the facilitators was as follows:

- 10 females, of whom 5 were medical doctors including 3 professors, 3 were PhD graduates and 2 were Masters graduates;
- there were 4 Whites, 5 Indians and 1 Coloured;
- their ages ranged between 30 – 55 years.

Each facilitator was interviewed in his / her office which took between an hour to an hour and a half. The interviews were recorded and later transcribed into text which took considerable length of time.

Four librarians were interviewed in the library, all but one with postgraduate qualifications in Library Science. The demographic representation of the librarians was:

- 2 librarians had an Honours degree, in Library Science, 1 librarian had a basic degree in Library Science and the 4th librarian had a Diploma in Library Science. Whilst the 3 qualified librarians performed specialized duties such as reference subject librarians, the 4^{th} librarian was responsible for the electronic resources in the library;
- there was 1 White female, 2 Indian females and I Indian male;
- their ages ranged between 30 – 55 years.

4.3 DATA COLLECTION

4.3.1 The Curriculum Development Task Force documents

The minutes from the Curriculum Development Task Force (CDTF) would reveal whether the Medical Library was involved in any way with Curriculum 2001 and the role that it was to play after its implementation at the Medical School.

4.3.2 Tattle Tape statistics

The Tattle Tape (counter at the exit of the Medical Library) statistics over the past six years would indicate whether the library was underutilized or utilized more in the traditional curriculum as compared to Curriculum 2001.

4.3.3 Questionnaires

A pyramid group was supposed to be used for the pilot study but the researcher had difficulty in getting the students from the traditional curriculum to meet together at a particular time. Therefore the researcher had to settle on a questionnaire for the pilot study which consisted of 20 students each from the 2nd year (Curriculum 2001) and 5th year (traditional curriculum) (Appendix 1). The researcher used a sample of 20 students each from the 2nd and 5th year classes for the actual research questionnaire. All the students answered the same questions, which determined the information seeking skills needed for the undergraduate curriculum. It also illustrated how the requirements and information seeking habits and skills of the students from both curricula differed, if there were any differences. This study was conducted between August 2004 and July 2005.

The study design attempted to check for variables related to the study and research habits of students in Curriculum 2001 and the traditional curriculum.

4.3.4 Interviews with the Facilitators

Due to the difficulty in setting up meetings with some of the facilitators, especially the theme coordinators and the doctors, the researcher had to settle for those who were at the Medical School. It was more convenient to interview the facilitators at the Medical School and IALCH. The facilitators who were unable to participate in this research project worked out of the greater Durban area.

Fifteen facilitators, most of whom also lectured in the traditional curriculum, were approached to participate in the interview consented to be interviewed. The dates, times and venues were set up at their convenience. Some of the senior facilitators, with regard to experience, were also Theme Coordinators or Designers for a particular year of study in Curriculum 2001, there were doctors (clinicians) and researchers (non clinicians). The selection from the different groups of facilitators was to determine their perceptions on information retrieval and the skills required to retrieve the information, their shortcomings in terms of their information retrieval skills, and their knowledge and awareness of what resources are available in the Medical Library in order for them to be able to guide the students in Curriculum 2001 to relevant and appropriate information.

The questions for the interviews centred on the facilitators' role in either the traditional curriculum or Curriculum 2001 and in both curricula, the skills required to teach or guide the students and the role of the Medical Librarians in both curricula (Appendix 2).

The interviews were recorded and later transcribed into word documents. The first 4 interviews were not recorded as the researcher did not have a recorder at the time and the interviewees were unavailable at a later date. These interviews were hand written and went somewhat slower in order for the researcher to be able to note the responses of the interviewees than the recorded interviews.

4.3.5 Interviews with the Medical Librarians

The Medical Library has 3 professional librarians and 1 electronic resources librarian, who has a degree but not in library science, who also assists the students in both the traditional curriculum and Curriculum 2001. Of the 3 professional librarians, 1 retired in December 2002 and the post was vacant for six months. A qualified librarian who has never worked in an academic environment previously filled the post in July 2003. All 3 qualified librarians together with the electronic resources librarian were interviewed using the same semi-structured interview. The questions for the interviews with the Medical Librarians were to determine if they thought their roles have changed after the introduction of Curriculum 2001 as compared to the traditional curriculum (Appendix 5). The retired librarian was not available to participate in the interview. The interviews were recorded and later transcribed into a word document

4.4 BIAS AND OBJECTIVITY

The minutest bias and objectivity in the process of interviewing may be very difficult to completely remove from the study especially when one is conducting a research into one's own field. The predetermined questions in the semi-structured interviews were

modified as the interviews progressed depending on the level of experience of the facilitators and librarians.

The questions varied slightly with some of the facilitators who were not involved in teaching in the traditional curriculum but were employed to facilitate for Curriculum 2001. The difference in the answers to some of the questions is evident of the attitudes and perceptions of the facilitators towards facilitating. Five of the fifteen interviews with the facilitators were not recorded because the researcher did not possess an audio recorder. There is the possibility that the researcher may have omitted some details that would have made a difference when analyzing the data.

One of the four librarians interviewed was employed after the introduction of Curriculum 2001 was unable to respond to all the questions that referred to traditional curriculum. The researcher was unable to make an appointment for an interview with a retired librarian who had the experience to cater for both the traditional curriculum and Curriculum 2001.

4.5 DATA ANALYSIS

The students' questionnaires were analyzed using the EPI Info software with the assistance of the UKZN biostatistician. Three of the fifteen questions had significant results which are discussed in Chapter 5 (page 88).

The semi-structured interviews with the facilitators and the librarians were transcribed into word documents (Appendices 3 and 6) which were then analyzed using the NVivo software. The raw data was categorized using the NVivo Software for coding common comments that emerged from the interviews (Appendices 4 and 7). Interpreting one's findings is the final step in the research process because existing practices may or may not be supported, new techniques which may be more effective may be introduced. The NVivo coding allows the researcher to look at the responses of the interviews critically, select common categories or nodes so that they could be classified. The researcher was looking for distinct trends, attitudes and perceptions among the facilitators and librarians in respect to their particular responsibilities. The nodes were further categorized into trees

4.6 SUMMARY

The researcher decided to use various methods in this study as mixed methods will shed more light on the subject. As a Subject Librarian myself, I am aware of the struggles and difficulties that they experience in trying to convince academics and faculty about the importance of information gathering skills that are so fundamental, especially in PBL.

CHAPTER 5

DATA ANALYSIS

5.1 INTRODUCTION

The data analysis below intends to look at and summarize the significant results of the data collected with the intention to extract useful information, make recommendations develop conclusions. The data were analyzed at the Medical School after they were collected. The aim of this study is to determine how the introduction of PBL has impacted on the role and functions of the library and librarians and whether the information retrieval skills that the students have are adequate for the demands of PBL by using the data from the following:

- the relevant extracts from the minutes of the meetings held by the CDTF prior to the introduction of Curriculum 2001 on the impact of PBL on the library and librarians. There is very little mention made of the role and functions of the library and librarians in the minutes;
- the books and journals loan statistics from the monthly printouts and the manually written statistics for the unbound journals indicate that the students were mainly using material from the Short Loan Collection and ignoring the vast collection of books on the open / general shelves;
- the tattle tape statistics were extracted for May from 1999-2004 which indicate the number of users leaving the library. However, these figures cannot prove that the students were either reading or gathering information in the library;

- the perceptions of the students on their usage of the library's resources by means of a questionnaire which signifies their attitude towards the library and its resources;
- the facilitators perceptions on the role of the library and librarians after the implementation of Curriculum 2001. About 50% of them admitted their lack of knowledge of the library's resources, especially the electronic material and databases. They also saw the need for greater involvement of the library and librarians in PBL; and,
- the librarians perceptions of their roles and functions after the implementation of Curriculum 2001.

5.2 DISCUSSION ON THE FINDINGS

5.2.1 Minutes of the CDTF meetings of the School of Undergraduate Medical Education (SUME) and the Medical Library

According to the minutes of a meeting held on the 3 December 1998, the Head of the CDTF is quoted as saying, "… one of the decisions reached about the new curriculum was that as much as possible it would be 'online'; that the students wherever geographically situated would have access to the resources that were available at Medical School". This statement is not very clear as to what resources the Head was referring to. However, I presume that he meant that most of the teaching material would be online together with the online resources that would be provided by the Medical Library. The CDTF was the task force under the then Medical Education Development (MEDev) which fell away when SUME was established in 2003.

At a meeting held on the 22nd January 1998, the Medical Librarian suggested to the CDTF that the 2 ways in which the Library may be able to provide the necessary literature for the students of Curriculum 2001 were through:

- a Reserved Collection in which the library collects all relevant material and keeps it in one place;
- study guides and bibliographies keeping in mind the copyright law.

The Reserved Collection, also known as the 'Short Loan Collection', has always been in existence in the library which housed all the prescribed and recommended textbooks. With the introduction of Curriculum 2001 the area of the Reserved Collection had to be extended to house the multiple copies of the same textbooks that were purchased for the first year students. The loan period for these books was restricted to 2 hours.

Due to the students' demands for additional recommended textbooks in the RBR, it is evident that they were not utilizing the library's resources to the optimum. They relied heavily on these books rather than becoming information literate to gather information from the many resources in the library instead of concentrating on books from the RBR. They focused very much on the availability of the books but not on how much were they learning. In order for them to learn more they had to read more and the assumption is that they did not consult other resources more widely.

The first meeting that included the library (22 January 1998) where it was discussed that "future library purchases should keep in mind the new curriculum reform as the students

would probably require a greater variety of reference and recommended textbooks" According to the minutes of the CDTF, the Principal Librarian was reported to have said with regard to the resources and space to house these resources for the students in Curriculum 2001, "Whichever way it was envisaged, it would have tremendous implications for the library, both financially and space-wise, because a reserve collection would require a complete area set aside specifically for the use of the undergraduates. Many students have never used library facilities and do not know how to search for material".

Mention was also made on the 2 June 1997 about life-long learning and problem-solving skills of the students but the Library was not included in teaching the skills required to assist the students in achieving some of these goals with specific reference to Information Literacy. Although life long and problem-solving skills were mentioned at the meeting, there was no further discussion in this regard to include the librarians to teach these skills to the students. There were no meetings between the coordinators of Curriculum 2001 and the librarians even at a later stage. Library orientation is just the basic introduction of the students to library where the layout, services and resources and rules and regulations of the library are outlined to the students. Thereafter, the librarians show them how to use OPAC to find books and journals in the library. During these hourly sessions the students are unable to develop information retrieval, life long and critical thinking skills to gather information from various sources. It appears as though the library and librarians were marginalized and ignored even though there was representation from the library at the meetings. According to Dodd (2007: 208), " Studies have shown that PBL students use

the library for longer periods of time; use a wider variety of resources to support their learning and require additional instruction in information seeking skills". It was further noted in the minutes that "a pure PBL curriculum would be very difficult to sustain with the resources available". The term resources in this context were vague because resources could mean either 'reading materials in the library' or 'human resources' referring to the facilitators and those involved in Curriculum 2001**.**

Even though a "research elective module" was discussed in a meeting held on 4 November 1999, there was no discussion on how the students were expected to find information on their research topics. There was a suggestion that a resource centre and a resource area for student use be situated in the library (19 Feb 1998). The research elective module refers to a module in the 2nd year of Curriculum 2001 whereby the students were expected to complete research projects that may take the form of a fieldwork study. In order for them to be able to complete their projects successfully, they need to be information literate to find relevant articles to support their projects. Therefore it is vital for the students to acquire the life-long learning skills and to become critical thinkers in the sphere of information literacy with the assistance of the librarians. The students can work independently to retrieve relevant information from any of the library's resources, like the print books and journals, electronic books and journals, the databases and even the Internet. They need to become familiar on how to access information from books by looking through the table of contents and indices and develop their own reading and resource lists. Using the general introductory and recommended textbooks, including the encyclopedias and wikipedia, is only a staring point for the

information retrieval. Librarians have to create efficient and seamless access to that library's resources, especially in electronic format, so that students can verify

Although the Librarian attended some of the CDTF meetings thereafter, there is no record of any discussions with specific reference to the library, its resources and the teaching of information literacy skills to the students**.** The Curriculum Development Task Force (CDTF) was the PBL Task Team in the then Department of Medical Development (MEDEV) that was tasked to organize and structure Curriculum 2001 prior to its implementation. The School of Undergraduate Medical Education (SUME), which was established in 2003 later, replaced MEDEV after which the CDTF ceased to exit. SUME then became responsible for designing and coordinating the undergraduate medical curriculum from 1st to 5th year.

The Librarian visited a few medical schools in Australia where PBL replaced the traditional form of undergraduate medical education. She highlighted a few significant aspects of her visits especially with regard to the role and involvement of the library and librarians after PBL was introduced in the medical schools. An information officer, another term for a librarian, at the University of Newcastle, is responsible for coordinating all the resources and updating them every 3 years. The students were charged $50 (R 300.00) to use the library books in their "home room" which accommodated 2 groups of students for the entire year. The deposits were refunded when the books were returned at the end of the year. The role of the librarians is briefly outlined after PBL was implemented at the University of Newcastle. Interestingly, there appears to be some similarity between the University of Newcastle and the Medical

School as there is no mention the role librarians played with regards to teaching information literacy and critical thinking skills to the students. According to the report of the Principal Librarian, the University of Newcastle was also interested in the book collection.

From the above, it appears that the proposal put forward by SUME emphasized the access of online material not only on campus but also off campus by the students, the library purchasing more reference books, multiple copies of the same textbook for the reserved collection and the life-long learning and problem-solving skills of the students. Although SUME recognized the role of the Library in providing the appropriate and necessary resources for students in Curriculum 2001, the proposal for Curriculum 2001 omitted to look at the changing role of the Medical Librarian from being available to assist the students to that of teaching the students the life-long learning skills for information literacy and information retrieval which is an essential component in self-directed learning as is advocated in PBL. After the implementation of Curriculum 2001, the librarians took a very active role for the first 3 years in teaching students how to access the library's catalogue, how to search the databases for the latest, relevant articles and how to evaluate websites on the Internet critically for authentic information relating to the topics in the various modules. In addition to this, the librarians also posted details of textbooks and websites relevant for the modules on the Open Learning System (OLS) which replaced WebCT. Unfortunately the librarians did not pursue posting relevant resources on OLS which eventually fell away after the third year into Curriculum 2001. However, the librarians did try to revive this service the following year but it has not come to fruition. Even though the librarians have liaised on many occasions with

personnel responsible for coordinating Curriculum 2001 from SUME, nothing concrete has come of it. Neither have the librarians been invited to SUME meetings where they could gain some insight into the modules in the curriculum.

With the introduction of PBL, the role and functions of the librarian is more than answering and attending to general reference queries and teaching students how to find books and journals in the library's catalogue. The librarian will have to teach students how to access information using tables of content and indices in books, analyzing search topics in order to find relevant information using electronic resources, ethical issues like sharing and not hogging or hiding books in the library, copyright issues and plagiarism. In order to assess and evaluate the students capabilities in effectively and efficiently retrieving information, the librarians would have to design a structured, credit bearing course in information literacy. Exercises using the main search options like author, keywords, and title could be the starting point to assess and evaluate the students. This course should be taught in all 5 years of study progressing from the simple, basic searches in 1st year to teaching them the more abstract and complex techniques in searching for information in 5th year. In so doing it is assumed the students would have acquired the information retrieval and critical thinking skills to become independent learners.

5.2.2 Empirical Observation

It is noted that there was an increase in the number of undergraduate students in the library since the introduction of Curriculum 2001. The table and graphs below illustrate

the tattle tape statistics and the number of books and journals issued in the month of May from 1999 to 2004.

TABLE 1: Book Loan Statistics 1999 – 2004 for May, including Tattle Tape Statistics are all users leaving the library

Year	Month	Open Shelf Books	Reserved Books	Unbound Journals	Tattle Tape
1999	May	1484	2828	162	25488
2000	May	1319	2800	163	15776
2001	May	2896	1982	85	29457
2002	May	3619	2724	62	29996
2003	May	3482	2848	88	31273
2004	May	3080	3412	129	24704

The statistics for the books on loan from the open shelves and the reserved room are shown for the undergraduate students whilst the tattle tape statistics reflect all users who exit the library. Initially, the researcher decided to use the statistics in June which is the middle of the year. But the students are on vacation in June and the loan statistics would not have been appropriate. Therefore the loan statistics were extracted from May for the period 1999 – 2004. The researcher used the statistics for 2 years prior to the

implementation of Curriculum 2001 and 4 years into the curriculum. the last year for the statistics was 2004 as the research was for the period 2003-2004.

The statistics in Table 1 indicate that the number of books from the open shelves (open shelf books) and the reserved books decreased by 165 and 28 in 2000 respectively when compared to 1999. It is difficult to explain the discrepancy with these figures. There was an increase of 1 unbound journal in 2000 as opposed to 1999. In 2000 there was a significant decrease in the number of users (9712) leaving the library. It must be noted here that the tattle tape machine was out of order for approximately 2 weeks which may explain the decrease in figures. The decrease in figures could also be due to the move of the postgraduate students from King Edward VIII hospital, situated next to the Medical School, to Inkosi Albert Luthuli Central Hospital (IALCH). Although the postgraduate courses were still offered at the Medical School, they were not within walking distance to the library anymore.

The implementation of Curriculum 2001 in 2001, as the name suggests, saw an increase in the number of books from both collections loaned to the students. There was a significant increase of 1577 in 2001 compared to 2000 and 723 in 2002 compared to 2001 and a decrease of 137 in 2003 and 402 in 2004 for books from the open shelves. It may be assumed that the increase in 2001 and 2002 was due to the fact that students in the PBL curriculum had to read more widely and may have borrowed more books from the open shelves. However, the addition of more books in the reserve collection during the course of 2002 and 2003 may explain the steady decrease in the loan statistics of the

books from the open shelves in 2003 and 2004. The students may have preferred using the reserve books as they were either prescribed or recommended textbooks. However, there was a decrease in the loan of reserved books by 818 in 2001, an increase by 742 in 2002 and 124 in 2003 and 564 in 2004 when compared to 2001, 2002 and 2003 respectively. The decrease in 2001 may be due to any number of factors, one of which may be that there were a limited number of books in reserved collection in 2001. The library subsequently purchased more books for the reserved collection which may explain the increase in 2002-2004. The tattle tape statistics increased from 2001-2003 and then decreased in 2004 by 6569 compared to 2003. This decrease was as a result of the closure to the undergraduate in September 2003 (see Figure 2 below)

TABLE 2 : Ratio of number of books / reserved books per undergraduate student

Year	Month	No of Students (TC)	No of students (Curr. 2001)	Total no of students	No of O/S Books per student	No of Res. Books per student
1999	May	880	-	880	1.68	3.21
2000	May	927	-	927	1.42	3.02
2001	May	801	192	993	2.91	1.99
2002	May	666	379	1045	3.46	2.60
2003	May	538	575	1113	3.12	2.55
2004	May	382	778	1160	2.65	2.94

In Table 4 the abbreviations TC refers to traditional curriculum, Curr. 2001 to Curriculum 2001, O/S to the open shelf and Res. to reserved.

From 2001 onwards the total number of students included both the traditional curriculum and Curriculum 2001. However, by observation, from 2001 the 2 hour loan books were used more frequently by the Curriculum 2001 students as compared to the students in the traditional curriculum still referred to their prescribed and recommended textbooks. The total number of reserved books loaned was effectively loaned out to the students in Curriculum 2001 because they literally rushed into the RBR as soon as the tutorials were over in order to secure the reserved books for themselves.

Contrary to the belief that the number of items borrowed by the students will increase with PBL, the ratio of the number of open shelf books and reserved books borrowed per student for May in Table 2 indicates that there was a decrease of the number of the open shelf and reserved books borrowed by the students in the traditional curriculum in 1999 and 2000 and in 2003 and 2004. The ratio of the open shelf and reserved books borrowed per student in 1999 was 1.68 and 3.21 and in 2000 was 1.42 and 3.02 respectively.

It is possible that the decrease in the ratio of material borrowed per student was due to:

- the increase in student numbers from 880 in 1999 to 927 in 2000 which impacted on the limited resources in the library;
- the students may have purchased their own prescribed and recommended textbooks which were the books that were in the reserved collection;
- the final year students rarely came into the library because they were on their clinical ward rounds at the hospitals three days a week.;

- the traditional curriculum was phased out in 2004 with only a few repeaters who completed their degree in 2006.

The difference in the number of books borrowed by the undergraduate students from the open shelves, including the 3 day loan books, and the RBR may be attributed to the following:

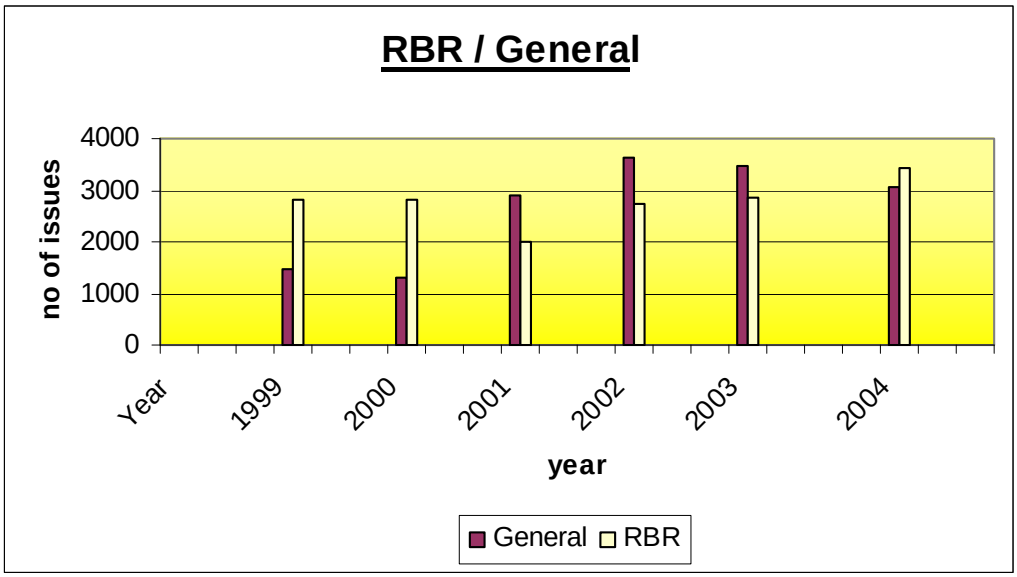
- most of the students in the traditional curriculum possessed their own copies of the prescribed and recommended textbooks which were available in the RBR. The number of students must also be taken into account because the lesser the number of students, the greater the number of books available to them;
- the increase in the number of students borrowing reserved books in 2001 indicates that the students in Curriculum 2001 relied heavily on the reserved books;
- the significant decrease in 2003 may be due to the fact that the number of students in Curriculum 2001 wanting to use the same number of reserved books was 575 as opposed to 192 in 2001 together with the students from the traditional curriculum;
- the students' responses in the questionnaires confirmed that the students purchased their own books even though they were not compelled to do so
- the 4^{th} year students in Curriculum 2001 rotated to the peripheral hospitals 3 days a week for their clinical work so they were not at Medical School during that time which could explain the decrease in the open shelf books in 2003 and 2004 and reserved books borrowed in 2003;

- more books in the reserved collection were available to the in 1st, 2nd and 3rd year due to the absence of the 4th year students from Medical School who were on clinical rotations which increased the ratio of reserved books borrowed per student in 2004.

The introduction of Curriculum 2001 saw an increase in the ratio of open shelf books and reserved books borrowed by the undergraduate student in both curricula.

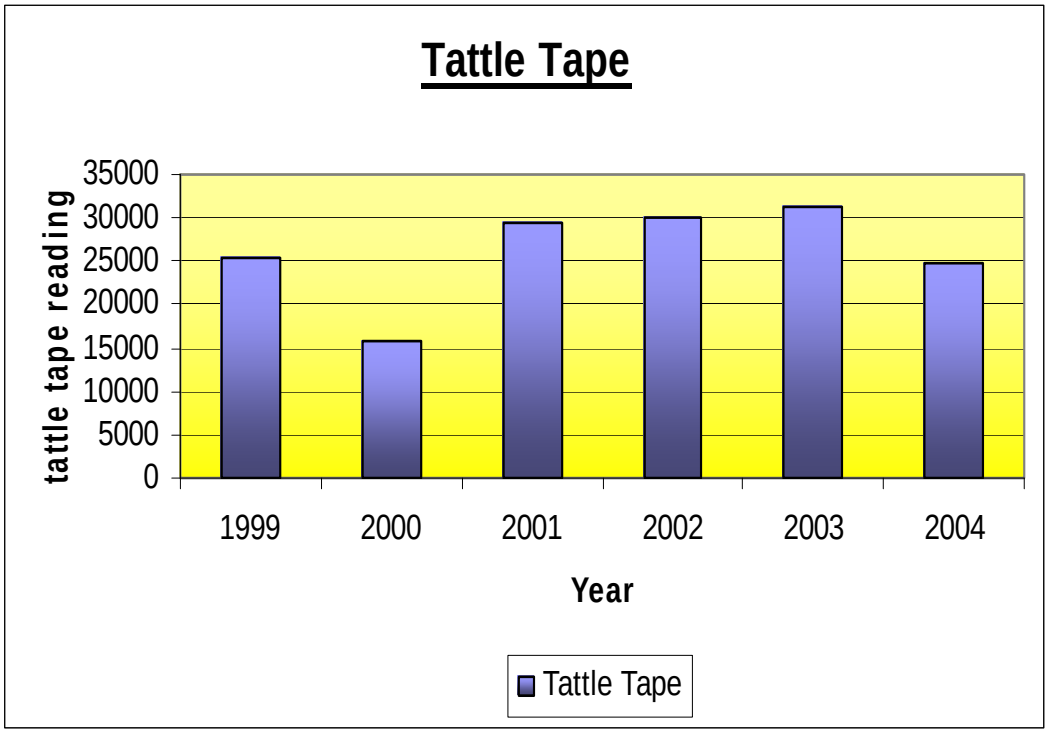
It is also suggested from Table 2, which describes the ratio of the number of open shelf books borrowed per undergraduate student increased from 2001 / 2002 and thereafter decreased from 2003 / 2004 that the students were reading additional books from the general / open shelves from 2001 and that the students from Curriculum 2001 consulted more books from the general / open shelf collection than the students from the traditional curriculum. The decrease in the ratio of books per student in 2003 / 2004 as compared to the ratio of books per student in2001 / 2002 may be attributed to the fact that most students in Curriculum 2001 will only read the books that are relevant to the themes in question. Overall, there is an increase in the ratio of books per student from 1999 to 2004.

Figure 1: Statistics for the Reserved Book Room (RBR) and the books from the general collection or open shelf for May 1999 - 2004



With the introduction of problem-based learning in 2001 the library had to expand its RBR collection to accommodate the additional and multiple copies of textbooks required for Curriculum 2001. In so doing a new issue desk and RBR was designed to accommodate all the new books as well as the students in Curriculum 2001. The RBR collection was now open access to all the students. In order to satisfy the reading needs of all the new students who were not given a prescribed or recommended book list, the multiple copies of a number of critical textbooks recommended by the theme designers / coordinators were placed on loan for 2 hours in the RBR. The students were not allowed to take these books out of the library. Due to the demand for these books by the undergraduate students, the library restricted the loan of these books to 1 per student. From 2001 to the end of 2003, neither the staff nor the postgraduate students were allowed to borrow the books that were on 2 hour loan as they were bought especially for the students in Curriculum 2001.

Figure 2: Statistics of the Tattle Tape Machine for May from 1999-2004 (every person who exits the library is counted)



The tattle tape statistics increased between 2001 and 2003 and then decreased significantly in 2004. This decrease could be attributed to the following:

- the students in both the curricula were away from Medical School for the better part of the year as they were rotating at the different hospitals around KwaZulu-Natal as part of their clinical training;
- the entrance to the undergraduate lan through the library was officially closed on the 14 September 2003.

Figure 3: Statistics of the usage of unbound journals for May from 1999-2004

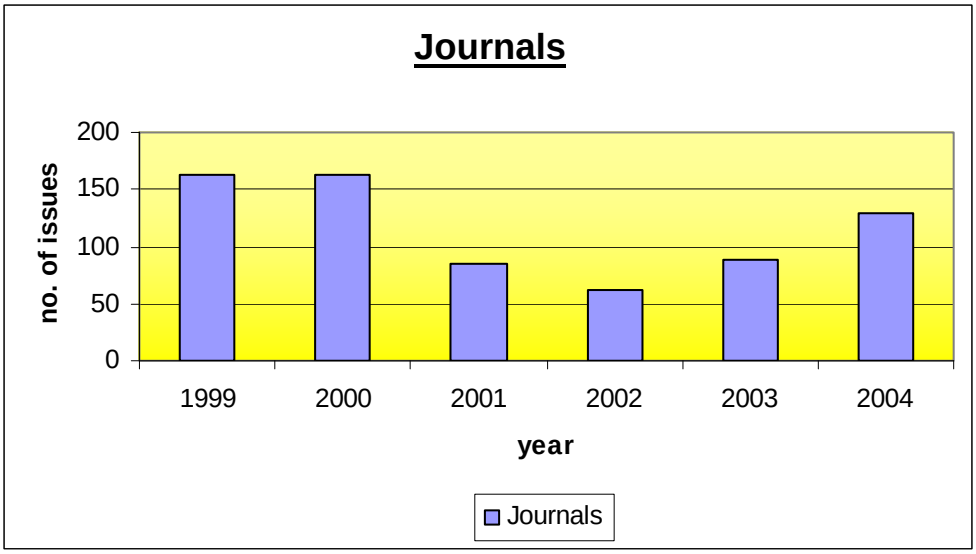


Table1 and Figure 3 reflect the statistics for all unbound journal that were loaned out by all the students, both postgraduate and undergraduate. The statistics form for the unbound journals did not differentiate between the postgraduate and undergraduate students. Therefore all the statistics until 2004 includes all the students. The statistics reflect that 162 journals were issued to the students and 163 journals in 2000. Simultaneously with the introduction of Curriculum2001, a section of almost all the departments in the Medical School and Wentworth Hospital (whose doctors used the Library frequently) were relocated to the new IALCH in Cato Manor which is approximately 6 kilometers away from the Medical School. The doctors are now rotating between hospitals and they find it difficult to come to the library as frequently as they did in the past. This could be one of the reasons why the statistics for the journals issued to the students declined from 2001 to 2004. Although the postgraduate students do not come into the library as often as

they did previously, the statistics for the unbound journals is fairly high and it showed an increase in 2004 as compared to 2003. This may be so due to the fact that they may have been unable to come to the library during the course of the week because they were no longer working at King Edward VIII Hospital which is next to the Medical School.

5.2.3 Students' Response to the Questionnaire

I must clarify the terms "information retrieval" and "research" which I used in the questionnaire before I continue with my analysis of the students' responses.

Information retrieval is a wide, often loosely defined term. In information retrieval we want to find those items which partially match our request and then select from those a few of the best matching ones. Unfortunately the word information can be very misleading. In many cases one can adequately describe the kind of retrieval by simply substituting 'document' for 'information'. Lancaster (1968) says that information retrieval does not inform (i.e. change the knowledge of) the user on the subject of his inquiry. It merely informs the user on the existence (or non-existence) and whereabouts of documents relating to his request. This means that a few basic pieces of information on a particular topic would satisfy one's needs for that moment. Research, on the other hand refers to an investigation, a critical inquiry or a careful study of a particular subject. A researcher delves into, examines and follows a line of investigation throughout the study and looks for the most relevant information that links to the study.

The following are the outcomes of the student questionnaires:

5.2.3.1 Not Statistically Significant

The responses for questions 1; 2a, b, d; 3; 4; 5a, c, e; and 6 to 15 were not statistically significant ($p > 0.05$).

5.2.3.2 Statistically Significant

Responses to questions 2c; 5b and 5d were statistically significant and is discussed below.

Q. 2(c) Computers are the main reason for visiting library

Crosstab

			Computers is the main reason for visiting library		Total
			no	yes	
year	2nd	Count	18	2	20
		% within year	90.0%	10.0%	100.0%
	5th	Count	8	11	19
		% within year	42.1%	57.9%	100.0%
Total		Count	26	13	39
		% within year	66.7%	33.3%	100.0%

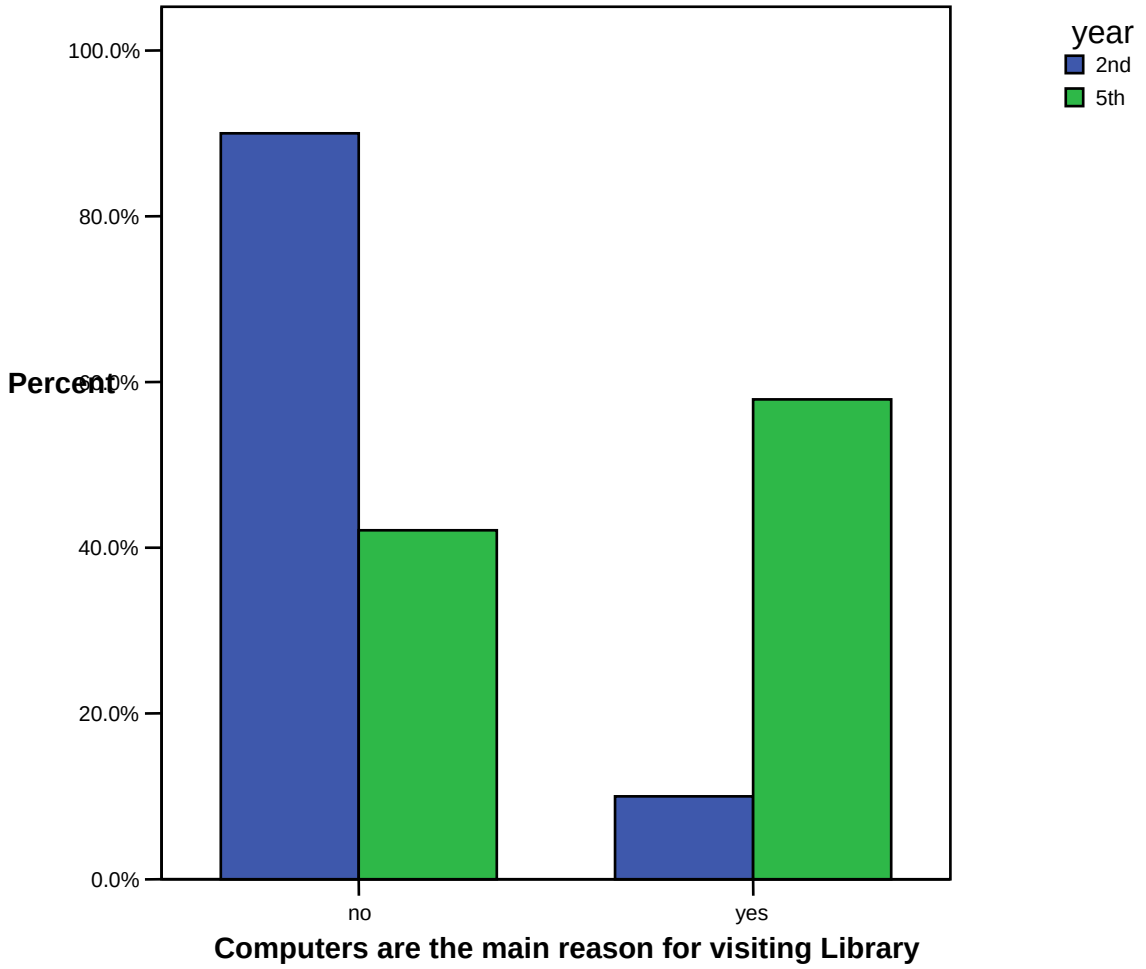
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.058(b)	1	.002		
Continuity Correction(a)	8.018	1	.005		
Likelihood Ratio	10.781	1	.001		
Fisher's Exact Test				.002	.002
N of Valid Cases	39				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.33.

Figure 4: Computers are the main reason for visiting the Library



Discussion

The results are **statistically significant** as the 5th year students in the traditional curriculum appear to be using the library for accessing the computers more often compared to the 2nd year students in Curriculum 2001. It is possible that because the 2nd year students were directed more towards textbooks, including reference books, to gather information that they did not access the computers as often as the students in the traditional curriculum. One of the reasons why the 5th year students access the computers is answered in question 5(d) below. Although this study compared the information

gathering habits of students from both curricula, it is assumed that the students in the traditional curriculum relied on recommended and prescribed textbooks or they purchased their own books and they may not have consulted books from the general collection. From the statistics in Table 1 that was a steady increase in the number of reserved books loaned to students. The inference is that the librarians need to become more proactive and market themselves as information specialists, to teach students the techniques and skills required to access information in any format effectively and efficiently.

Q. 5(b) Journals used most often

Crosstab

			Journals used most often		Total
			no	yes	
year	2nd	Count	20	0	20
		% within year	100.0%	.0%	100.0%
	5th	Count	14	6	20
		% within year	70.0%	30.0%	100.0%
Total		Count	34	6	40
		% within year	85.0%	15.0%	100.0%

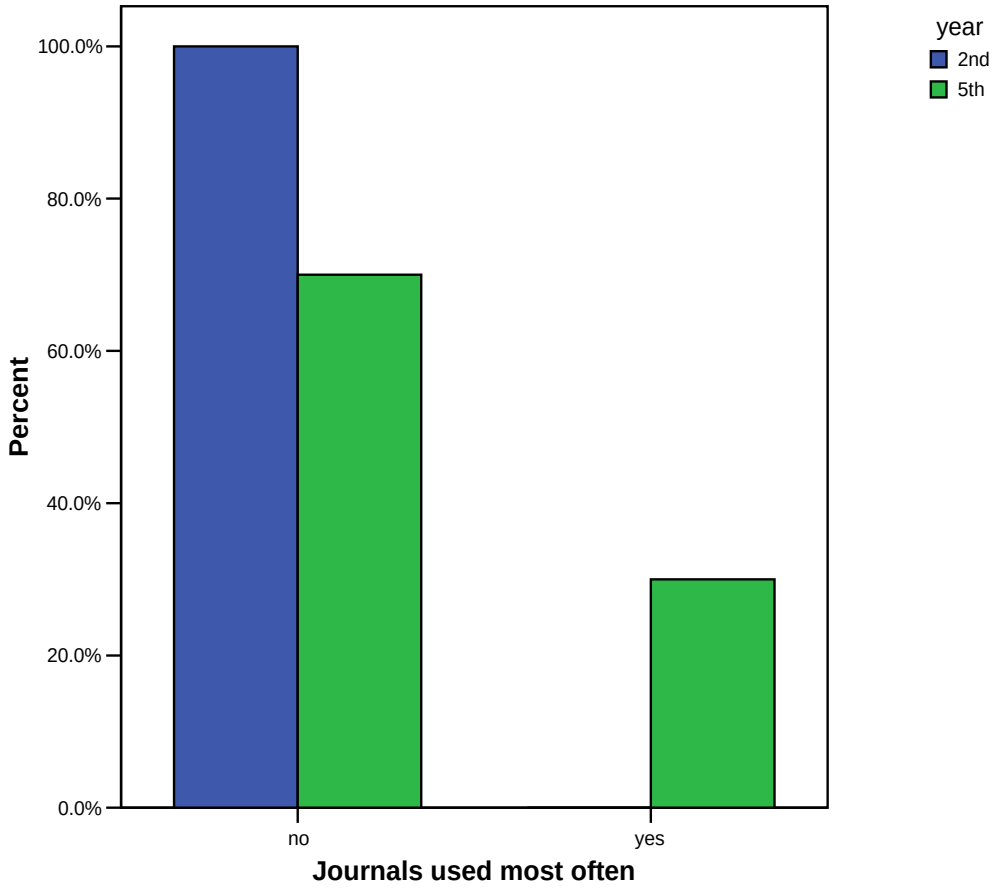
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	7.059(b)	1	.008		
Continuity Correction(a)	4.902	1	.027		
Likelihood Ratio	9.382	1	.002		
Fisher's Exact Test				.020	.010
N of Valid Cases	40				

a Computed only for a 2x2 table

b 2 cells (50.0%) have expected count less than 5. The minimum expected count is 3.00.

Figure 5: Journals used most often



Discussion

One of the reasons the results are statistically significant is that the students in the

traditional curriculum are often given references to journal articles available in the library by their lecturers. Therefore they do not have to access the electronic databases in order to retrieve journal articles. The students in Curriculum 2001 are given reading lists of textbooks available in the library, therefore all the respondents said that they do not use the journals often. (see crosstab above). It is evident from figure 5 that the 2nd year students did not refer to or access any journals for current information on their topics of discussion in PBL. This indicates that they did not use the electronic databases to search for information using the keywords and data gathered from their tutorials. There is a need for the librarians to teach them the techniques and skills to search these databases for full text articles and references that are current and relevant to the topic. The students are required to read widely around the topic.

Q. 5(d) Internet used most often

Crosstab

			Internet used most often		Total
			no	yes	
year	2nd	Count	17	3	20
		% within year	85.0%	15.0%	100.0%
	5th	Count	7	13	20
		% within year	35.0%	65.0%	100.0%
Total		Count	24	16	40
		% within year	60.0%	40.0%	100.0%

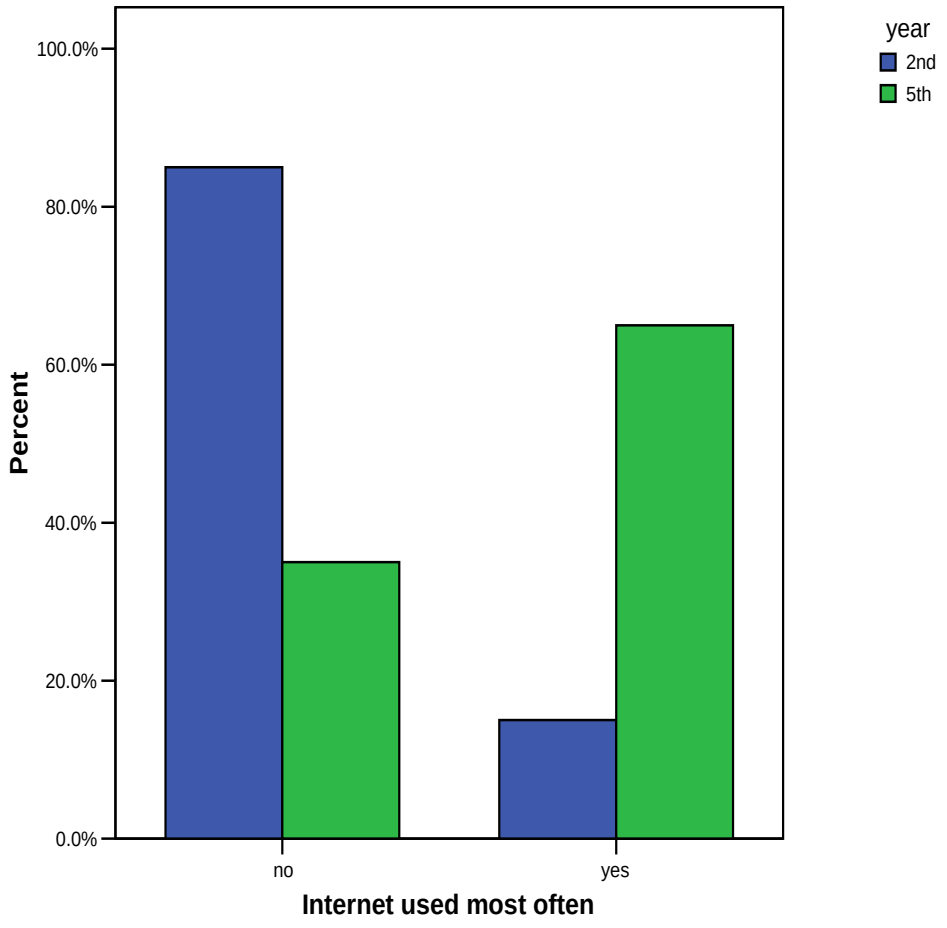
Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.417(b)	1	.001		
Continuity Correction(a)	8.438	1	.004		
Likelihood Ratio	11.035	1	.001		
Fisher's Exact Test				.003	.002
N of Valid Cases	40				

a Computed only for a 2x2 table

b 0 cells (.0%) have expected count less than 5. The minimum expected count is 8.00.

Figure 6: Internet used most often



Discussion

The results are statistically significant where at least 15% of the 2nd year students said

that they access the internet as compared to the 65% of the 5th year students. It appears that the 5th year students use the computers to access the internet (Appendix 1 for question 2c), which may not be for academic purposes. These students are given prescribed and recommended textbooks to refer to and references to journal articles are given to them by their lecturers. The 2nd year students have to consult various resources that they are able to use so that they have enough information when they go to their feedback tutorial sessions. Contrary to the expectation that more PBL students would access the internet, it was found that only 15% of the sample accessed the internet for information. There are many very reliable, academic sources on the internet that students can access and it is assumed that did not know how to access them.

As question 15 is somewhat vague, the responses of some of the students may not be a true reflection of their understanding of what is the difference between a reference and a bibliography. The question should have read, "Which of the following are required to write a bibliography for a journal article?" The word reference should have been omitted.

Although there were 15 questions in the questionnaire, the respondents ticked more than one answer if it applied to them. Therefore when I analyzed the data I had to take this into account and the number of responses totaled 35. Only 3 of the 35 responses in the questionnaire were statistically significant. There are some suggestive trends which were not quite statistically significant. It appears that the students from both, the traditional curriculum and Curriculum 2001 show some similarities in the way they utilize the library even though the 5th year students are more senior and have been at Medical School for at least four and a half years compared to the 2nd year students who have been

at Medical School for at least 18 months at the time of the study.

The following are some of the similarities between the students in the traditional curriculum and Curriculum 2001:

- they use the library at least 2-3 times a week;
- accessing information is the main reason that they use the library;
- they do not use the resources in the library as best as they could thereby disadvantage themselves in locating additional and relevant information ;
- they do not ask the librarian for help;
- they consult books and journals from the library;
- they do not use the online databases to find information ;
- they consult books more often for their information;
- they do not use the CD Roms to retrieve information**;**
- most of them said that the books and journals were not available in the library as they were constantly on loan;
- most of them agreed that there were insufficient copies of books to cater for all the students in the library;
- they said that they bought their own books;
- they feel confident looking for and analyzing the information themselves;
- they said that the library did not provide adequate training in information retrieval. This contradicts their claim that feel confident to locate and analyse the information retrieved;

- they do not access the Open learning System (OLS), a platform on which the library put relevant information for them;
- they did not know what details are required to a reference for books and journal article.

The analysis of the data collected using the a number of variables , that is the students' questionnaires, the Tattle tape machine statistics, the relocation of the doctors and most of the departments to Inkosi Albert Luthuli Central Hospital (IALCH) makes it extremely difficult to track changes quantitatively in this study.

It is evident from the above statistics that the students are not utilizing the library's resources to its fullest.

5.2.4 INTERVIEWS

5.2.4.1 Facilitators

Although the interview consisted of questions relating to the teaching processes and skills, including the skills in facilitation, the two primary aims for interviewing the fifteen facilitators, some of who were professors and senior medical consultants (academics), research scientists and postgraduate students, were:

- to ascertain whether they were aware of the facilities, services and resources, both electronic and the print, available in the library; and,
- to ascertain if they were using these resources to its optimum in gathering the required relevant information for discussion in their tutorials.

It is evident from the responses that eleven of the facilitators are aware of the resources, both electronic and the print, available in the library and that they do refer the students in Curriculum 2001 to these resources (Appendix 3). However, only three of the eleven facilitators do actually use these resources themselves most of the time to prepare for the tutorials and they have requested more advanced training especially with regard to the electronic resources in the library. Four of the facilitators were vaguely aware that the library provides access to some databases or the other but not quite sure what they are as they do not use them at all. One of the facilitators commented, “I did not know what databases are available in the library” with regard to the resources in the Library.

One of the questions in my interview dealt with the demands made by problem-based learning on the facilitators in terms of preparation for the tutorials. Surprisingly, six of the facilitators said that no extra preparation was required whilst the other nine said that they had to read and acquire some information before they went to the tutorials so that they had some knowledge on the background of the cases in question. However, three of the six facilitators who said that problem-based learning was not demanding contradicted themselves later on in the interview by saying that they had to ”read” for the tutorials and two of them said that the load of their administrative work demand more of their time. One of them said that it was not more demanding only because she spent the same amount of time researching and preparing her lectures for the traditional curriculum as she does in the problem-based curriculum, quote, “**PBL – not more demanding. With both curricula you have to prepare. No way you can lecture and not prepare”.**

TABLE 3: NVivo nodes of the comments by the 15 facilitators on what they should do / know with regards to the Library and its resources

NVivo Node	No. of Facilitators
Electronic resources	10
Information Literacy skills	14
Information management	7
Information retrieval	15
Search strategy	7
Teach facilitators	12

The above table indicates the perception of the facilitators with regard to the resources in the Library and how could they access these resources. Ten of the fifteen facilitators indicated that they need to know what electronic resources are available in the Library and they require training in these resources specific reference to the electronic databases. They felt that they needed to know more, gain more knowledge because the themes were multidisciplinary and was broader based. In so doing they would be able to guide the students in the right direction. The other five facilitators had a vague idea of the available resources felt that they knew enough to get them through their facilitation. The facilitators felt that they need to acquire skills in Information Literacy, information retrieval, information management and search strategies.

The following are comments made by 6 facilitators with regard to their information literacy skills and the training that is essential for them to acquire these skills:

- "As a facilitator I certainly need to brush up on my information literacy skills so that I can guide the students to read relevant material to cover the content of their themes".

- "I need to learn how to use the Internet and searching the databases more effectively".

- "I certainly have to acquire more information literacy skills to be able to use the databases more effectively". . I have to learn how to perform literature searches in finer detail so that I can find relevant articles and I do not have to wade through a whole lot of unnecessary material".

- "I lack the knowledge on how to assist or teach the students on how to perform a literature search or research a topic".

- "I have to read before I go the tutorials especially for feedback sessions because I will feel very uncomfortable if I am not familiar with the problems / cases that are discussed"

- "I definitely need more training on how to search databases and use the Internet more effectively".

All fifteen facilitators said that the roles of the medical librarians have changed especially with the introduction of Curriculum 2001.

The following are comments made by the facilitators regarding the changing roles and functions of the librarians are listed below:

- "…looking from the outside, professional librarians in the medical school have been significantly more active with the clientele because people are now aware of so much that is going on, not just in the library but in the electronic media that the library of necessity controls of and has information about".

- "The library did not purchase electronic databases as a result of problem-based learning. The reasons for purchasing the databases are that:
    - the electronic media is the trend in academic libraries worldwide;
    - the number of databases related to medicine and its disciplines have grown over the years;
    - the electronic media caters for the needs of the academics, postgraduate and undergraduate students;

- there is no space in the Medical Library to house the hard copies of the bibliograrphic material".

- "All the users have access to these databases at their desktop".

- "A.D.A.M., the InterActive Physiology series on CD Roms were purchased 1996 for the students in the traditional curriculum for teaching purposes. They are made up of the following sections: cardiovascular system, respiratory system, nervous system and urinary system. Subsequently relevant CD's were purchased for teaching purposes, not necessarily for Curriculum 2001)".

- "I see the librarians expanding their roles in terms of orientating the students, teaching them how to use the books and journals appropriately, teaching them how to access electronic information, how to do literature searches and how to do their bibliographies for their assignments and research projects".

- "You are educators like the rest of the academic staff. Everyone's role has changed. You are doing postgraduate work in medical education and you should be rewarded for that".

A few comments by facilitators in response to their own and the students' information literacy skills are illustrated below:

- One of the facilitators said, "It would be important for the students to leave the Medical School with those skills for themselves, of being able to evaluate what they read, a journal article, a chapter in a book or the internet. These lifelong learning skills in information retrieval will equip the students to become critical thinkers and evaluate the reading material that they retrieve".

- A facilitator commented on her own skills, "It was not so bad because I already had the necessary skills for information retrieval which I acquired when I did my PhD". Therefore she was able to direct the students to the relevant resources in the library.

- A comment made about the students' contributions in the tutorials by another facilitator is as follows: "In the feedback sessions in the new curriculum, in problem-based learning, the follow-up sessions, it is very obvious that students have read a wide variety of references".

- Another facilitator did a survey with the **1st year students in 2003** and the following was the outcome in her survey with reference to the resources in the library

> **"Resources in the library. Survey Theme 1.1**
> The following is the response to the question, "**Were you able to find suitable resource material?"** 33 of 178 students said no, 16 were new students, the others were much older. 24 of the 33 said insufficient books in the library and the others (9) were about evaluating information, finding enough detail to meet the learning goals, did not know how to use the internet, did not know how to use the library. Quote by the facilitator, " All this goes back to the library. The librarian has to teach the students how to access information. The orientation at the beginning of the year is obviously not enough". It is obvious that the students need skills to look for information and documenting".

The above are some of the relevant comments extracted from the interviews that relate to the awareness of the facilitators of the resources available in the library and whether they use them or not.

5.2.4.2 Librarians

All three professional librarians and one para-professional librarian were interviewed. Professional in this context refers to a graduate librarian and para-professional to a librarian who has a Diploma in Library Science One of the three professional librarians started working in the library in mid 2003, well after the implementation of Curriculum 2001. Therefore she was unable to comment on the practices of the librarians prior to the

introduction of Curriculum 2001. However, the other three members of staff, including myself have been in the library prior to PBL implementation to observe the transformation of the library with regards to the evolving roles and functions of the librarians and the increased resources and facilities in the library.

Initially all the prescribed and recommended textbooks that the library purchased to satisfy the reading needs of the students in the traditional curriculum were put into the Short Loan Collection, also known as the RBR, for a loan period of 3 days. Two comments made by the principal librarian during the interview, “In the traditional curriculum one followed what was in the students’ handbook, what was prescribed by the departments. You didn’t really deviate very much from that because those were the only books the students were expected to use”; “They were not expected to read outside what was prescribed or recommended” is proof enough that more emphasis was placed on the need for prescribed and recommended textbooks than on teaching the students the necessary skills to enhance information retrieval. Yet, a literature review on information retrieval and PBL and librarians reveal that students’ information needs are greater in PBL than in the traditional curriculum.

Another librarian commented on the purchasing procedures of the library with particular reference to the needs of the students in the traditional curriculum, “Books were purchased for the students, the prescribed and recommended ones (*books*) went into the Short Loan Collection and the others onto the open shelves”.

A further comment made by a senior librarian with regards to the reading habits of the students in the traditional curriculum, “The students referred to their prescribed and / or recommended textbooks, notes and handouts from their lecturers. They did not really have to retrieve literature from any other sources…”.

With the introduction of Curriculum 2001, the students were not given a list of prescribed or recommended textbooks and the library purchased multiple copies of a number of books, at least ten of each title, which were then put into the Reserved Book Room that could be loaned out for 2 hours. There were neither reservations nor any renewals allowed.

The following are some of the comments made by the Librarians regarding the reading material for the students in Curriculum 2001:

- “the outlook to purchasing resources changed completely”.
- “only by knowing exactly what is in the module, what is expected of the students, will you know what resources the students can use”.
- “by knowing what is expected of the students then you can start looking at supplementary books which you can purchase which complements what is suggested by the module”.
- “here ARE no prescribed books, they’re all recommended and the library purchased those books”.

TABLE 4: NVivo nodes of the comments by the Librarians with regard to their involvement with Curriculum 2001

NVivo Nodes	Number of Librarians
Assessment	2
Databases	4
Facilitator Training Workshop	3
Information Literacy skills	4
Library WebCT	2
Support curriculum	3
Understand themes	4

The Librarians saw the need to become more involved with Curriculum 2001. They were aware that the students in the problem-based learning curriculum will require a wider variety of resources, not only textbooks, but also journal articles and electronic resources like the databases and the Internet to consult. Table 5 is indicative of the Librarians attitude and commitment to the change in the undergraduate curriculum from the traditional approach to teaching to the PBL curriculum, which encouraged the students to search for information, themselves.

It is imperative that the students, especially in Curriculum 2001, become critical thinkers and information literate in order to learn how to access and locate relevant information so that they can participate successfully in their tutorials and more so when they become

practicing doctors. These life-long learning and critical thinking skills instilled in them as undergraduate students will augur well in the future. One block in the curriculum is completely dedicated to research and it is at this point that the students have to learn to use all the resources, mainly the electronic resources like the databases and e-journals, so that they can retrieve relevant material to satisfy their research requirements. The task of assisting the students to become critical thinkers and information literate is that of the Librarian who teaches them how to search the databases and the Internet effectively to retrieve this information. The teaching aspect of librarianship is unmistakable in the comment by one of the librarians, "I teach the research elective students on how to perform a literature search using the databases, the Internet, how to evaluate the resources accessed via the Internet and how to write a bibliography using the Vancouver style of referencing". One of the librarians also alluded to the fact that many of the departments in the faculty commented on the involvement of the library in Curriculum 2001. I quote what the Librarian said in the interview, "It was quoted by many other departments the fact that the library had become involved, because we were one of the most involved libraries, in student teaching and support." She goes on to add**,** "They *(the students)* ask for advice more often in that they approach the Librarians to help them to search or teach them how to search". It is so important to teach and assist the students to develop a good search strategy, using relevant keywords to perform a worthy literature search that would retrieve good adequate references.

To equip the Librarians to understand the themes and the essence of problem-based learning 2 librarians attended the facilitator training workshops for facilitation and 1 acted as a facilitator to the 1st year students in 2001.

The librarians tried to ensure that they understood, as far as possible, what was expected of the library and of them as librarians so that they knew how the students were being taught in order to be able to support the curriculum. The idea was that each professional librarian would coordinate and access leading resources for two themes for each year of the undergraduate curriculum. There were six themes per year and three Librarians and each person was assigned to two themes. Most of the students in Curriculum 2001 use the library to find the information and answers to their questions posed at the first tutorial where the case or problem is discussed so that they may be prepared for the discussion at the follow up tutorial. It is a requisite of Curriculum 2001 for the students to read widely in addition to the recommended textbooks. The students who searched the databases also looked for the journal articles from the references they retrieved in their literature searches. The opinion of one of the librarians is that problem-based learning encourages the students to acquire the lifelong learning skills in information retrieval from 1st year because they have to locate additional and relevant reading material themselves throughout their years of study.

The results of the survey carried out by one of the facilitators on finding suitable resources indicated that the clearly indicates that the students are either lacking the skills or not confident enough to search for and locate information. The facilitator commented

that the orientation at the beginning of the year “is obviously not enough”, adding that the Librarians have to teach the students how to access information and in so doing will assist the students to develop their Information Literacy skills.

5.3 SUMMARY

5.3.1 Main Findings

The analysis of the CDTF minutes indicated that the issue of space and the number of books required for the Curriculum 2001 were discussed at the meetings. The Issue Desk and Tattle Tape statistics saw an increase in the loan statistics of reserved material after the implementation of Curriculum 2001 from 2001-2004 and a decrease for the books from the open shelves by 2004. There were 3 statically significant responses from the students’ questionnaires which showed that the information gathering habits of the 2nd year students (Curriculum 2001) differed from that of the 5th year students (traditional curriculum). The overall responses of the facilitators revealed that they have to become more information literate. They said that although they do use the library’s resources, mainly the electronic resources and the Internet, they do not use it very efficiently and effectively. The librarians responded that they noticed a change in their role and functions after the implementation of Curriculum 2001. They took the initiative to become involved with the curriculum and provided reading material for the students which was available on WebCT.

5.3.2 Main Limitations

The minutes of the CDTF meetings did not reveal much with regards the role that the library and librarians in Curriculum 2001. In retrospect, it seems as though the library was marginalized and not actively involved in the planning and discussion process of Curriculum 2001. The comments made by 2 librarians that there was no “buy in” from CDTF from the beginning and “I spend a fair amount of time teaching the students …” indicate that the library was insignificant in terms of their role as educators, with specific reference to information literacy in the curriculum. The librarians are seen as technicians and not as educators who could play a role in enhancing independent learning given that they are constantly updated with new technologies and are continuously trained in new search strategies employed to retrieve the latest information.

Data for 6 months of each year from 1999-2004 instead of 1 month would have revealed more realistic figures for the book loan and tattle tape statistics. The move of the doctors to IALCH from King Edward the VIII Hospital also influenced the book loan and the tattle tape statistics.

CHAPTER 6

CONCLUSION

6.1 AIMS AND OBJECTIVES OF THE STUDY

The Nelson R. Mandela School of Medicine encouraged by and in keeping with the changing trends in academic undergraduate teaching in medical schools internationally decided to review the traditional method of teaching, which was didactic and lecture based. The PBL curriculum, referred to as Curriculum 2001, was introduced at the Nelson R. Mandela School of Medicine in 2001. Initially, with the introduction of Curriculum 2001 there were changes in the Library to meet the requirements of the students with regard to new resources, namely recommended books and the construction of a new RBR to house thee books. The roles and responsibilities of the Librarians also changed in the beginning when they took the initiative to prove additional reading material for the students on WebCT. In the traditional curriculum the emphasis was on finding books and journals in the library using the catalogue. In PBL students are expected to read widely and sift the information they need. In order to do this should have to develop search strategies and acquire the necessary skills and techniques, to become information literate, to search efficiently and effectively for information using the library's resources. In the past the Librarians have taught students how to access information but only when the need arose. With PBL teaching information literacy should be an ongoing practice as information is changing and all the time and many new resources are available regularly. Information literacy courses should be built into the curriculum from the beginning.

Due to its very nature of self-directed learning with Curriculum 2001, one of the main tasks of the librarians is to assist the students with the information literacy skills which are essential to search for, locate and retrieve information efficiently. In so doing the undergraduate students can become independent users of the library and continue to search for information efficiently when they become doctors and have to keep abreast of new information and happenings in medicine. Through PBL, librarians can assist the students enhance their prior knowledge by developing effective and successful searching skills and to learn to evaluate the resources (Snavely 2004: 523). She continues to add that instructors and librarians contribute to the session (instructional programs) by collaborating on objectives and learning goals, creating research questions, recommending lists of resources and questioning. (2004: 522). By comparing their results with their colleagues they will learn the strengths and weaknesses of the various databases and the Internet.

6.2 LITERATURE REVIEW

Knowledge explosion has seen a tremendous amount of new information available for the in the academic world. The students have a vast amount of information from which they have to decide on what is relevant and what is not. Being information literate would help them to be selective about gathering the information they require. Bruce says that learning opportunities that enhance information not only make use of information and communication infrastructures, but also are designed to bring information practices into the curriculum. According to a paper delivered by Oker-Blom at the 64th IFLA General Conference in 1998, “Teaching faculty in higher education considers library use an

academically desirable activity. When they formulate overall goals in university handbooks or student guides, information skills are implicitly included in them or sometimes explicitly mentioned". IFLA is the International Federation of Library Associations.

The way to retrieve and manage information is being challenged by new concepts of information, by the need for new ways of dealing with information retrieval. Bradley (1996) says that the knowledge base that has formed the basis of academic education for Library Information Science professionals is essential for the effective management of this new recorded knowledge, both for its base in the management of print-based knowledge and for the evolving knowledge base relevant to the new recorded knowledge. Bradley is referring to the knowledge base bringing together the task of managing information of both the print and electronic versions within the context of the library. The organization of knowledge is becoming increasingly important whether it involves performing literature searches in order to retrieve information, the organization of the information, accessing the databases, the electronic journals and the digital information sources like the library homepage**.**

According to Watkins (1993) librarians fulfill many roles which include them as the traditional service providers, as resource persons, as tutors or as facilitators. She emphasizes that the role of the librarian as a faculty member is strengthened by PBL. The challenges of the medical librarians in the future environment include technology, and their professional roles in filtering information from the electronic databases to the

Internet. A particularly huge professional challenge will be teaching the students how to access relevant information and how to manage and organize the information they retrieve from the vast quantity of data and information found on the Internet. The challenge is from teaching students to understand the basic concepts in literature searching to the more abstract and complex issues that surround the information retrieval. There is more to it than looking for a book or journal in the catalogue as students will not find a book title that will be exactly like their topic or keyword. Students must use the table of contents, indices and previews in the book to have an idea of the content of the book.

6.3 SUMMARY ON THE FINDINGS

Discussions at the CDTF meetings revolved around the resources in the Library and where they would be housed. There were no discussions on what role the library and the librarians would play in Curriculum 2001. Because the librarians were not involved in the planning stages of Curriculum 2001 there was no input from them regarding their the role and functions in the curriculum. Students are expected to find information to satisfy their learning goals by themselves and to do this they should have some information literacy skills. There was no mention made of life-long learning and problem-solving skills which are some of the important aspects of self-directed learning. The omission of information literacy skills and critical thinking, two very basic components of finding information was apparent at the CDTF meetings.

It was noted that the students' use of the Library and its resources from Curriculum 2001 was not significantly different from that of the students in the traditional curriculum. There was very little difference in the borrowing habits of the undergraduate students contrary to the belief that the students in Curriculum 2001 will utilize the Library more than the students in the traditional curriculum due to the nature of teaching and instruction. There was a slight increase and then a small decrease in the ratio of the number of books from the open shelves and the RBR books that were borrowed by the students in both curricula. However, looking at the tattle tape statistics there was a significant increase in the number of users in the Library after 2000

.

Three questions in the questionnaire for the students were statistically significant which revealed that there was a difference in the way the students from the traditional curriculum and Curriculum 2001 used the library and its resources. According to the results of the questionnaires the students are not using the library's resources optimally. It is assumed that they prefer to use the reserved books and that they are not aware that the books on the general shelves also contain information they require.

The interviews with the facilitators revealed they used the library and its resources differently from each other. Some of them indicated that they need more training on how to access the electronic resources as they are constantly updated and new features added to them. In addition they said that they were not aware of some of the electronic resources that provided full text articles. Therefore they used the Internet if they required any additional information. Some of the facilitators in Curriculum 2001, who previously

lectured to students in the traditional curriculum, indicated that they did find it difficult not to teach but to guide the students in the PBL environment. They also said that they still used the resources in the Library, both online and printed material, to supplement their knowledge to be able to guide the students in Curriculum 2001 in the right direction to learning. The others from this group said that they did not see the need for additional reading to guide the students. All of them indicated that they see the role and functions of the librarians change to teach not only the students but the facilitators as well to develop search strategies to search for information effectively and to acquire information literacy skills.

All but one of the librarians could not emphasize enough that their roles definitely changed with the introduction of Curriculum 2001. Although 1 librarian was appointed shortly after the introduction of Curriculum 2001 she also indicated that she interacted a great deal with the students in Curriculum 2001. Prior to Curriculum 2001, the Librarians assisted the undergraduate students but interacted more with the postgraduate students and the staff. After the introduction of Curriculum 2001, there was more interaction with the undergraduate students as they constantly came for assistance to find information, more teaching was done by the librarians with regards to access to the databases, how to use them, that is the information literacy skills and critical thinking, how to find the information of the shelves, evaluation of websites, referencing techniques when writing their bibliographies for their research projects and posting reading material and useful websites on the Library's Open Learning System (OLS) which replace WebCT. The survey with the librarians indicated that they perceive their role and functions become

more demanding as long as information continues to grow at the rapid rate that it is and the students needs to be selective about the information they need.

A quotation from an essay from the Roundtable on technology and Change in Academic Libraries convened by the Association of College and Research Libraries in 2006 outlines the challenges that the libraries face in their institutions, “In redefining and reasserting their value, libraries will have to embrace much more aggressively the fact that they are one of many contenders for their institution’s financial support”.

6.4 LIMITATIONS

Having noted what the literature said and using that to achieve the aims and objectives of the study led me to the methods employed in the study. The aim of the study was twofold. Firstly it was to determine whether there was a change in the roles of the Librarians with the introduction of Curriculum 2001 and secondly, whether there was any difference in the usage of the library between the 2nd year undergraduate students in Curriculum 2001 and the 5th year undergraduate students in the Traditional Curriculum.

The instruments used in the study were the minutes of the CDTF, questionnaires handed out to an equal number of students from the 2nd year class, representing Curriculum 2001, and the 5th year students, representing the traditional curriculum. I also interviewed the Librarians to ascertain if their roles have changed at all with the introduction of Curriculum 2001 and the facilitators to determine if their roles have changed at all as compared to formal, if they did lecture in the Traditional Curriculum, their knowledge of

the available resources, both physical and electronic, in the Library and how to access them.

6.4.1 Students' Questionnaire

The following were the shortcomings of the study with reference to the questionnaire:

- some of the questions were incorrectly worded which resulted in vague responses from the students. The questionnaire may have confused the students when they had to make a choice of answers;
- it was very difficult to get hold of the sample students in 5th year as they were off campus most of the time;

The questionnaire should have been more specific with regard to access to information like the databases and the Internet and what do the students to locate the information, like books, journals and online material.

6.4.2 Interviews

6.4.2.1 Facilitators

There were two notable limitations with the interviews. One is that it was very time consuming as the doctors who were facilitators were working at IALCH. The researcher had to go to meet them which is understandable especially as the doctors had to be at the hospitals. Often enough the appointments I made with them were frequently postponed at the last minute due to an emergency that they had to attend to which delayed the interviews. New appointments were made until the interviews finally took place. The other limitation was that the researcher, unaware at the time, did not record on tape the

first three interviews. It was very difficult to make appointments with these facilitators later as they were external people.

6.4.2.2 Librarians

The retired Librarian was unavailable at the time the interviews which was unfortunate as he had the experience of being a librarian for both curricula. The newly appointed librarian did not have much interaction with the students in the traditional curriculum and was unable to respond to all the questions. Another shortfall of this study was the omission of inviting the medical librarians from the other medical schools in the country to participate in this research.

6.5 RECOMMENDATIONS

There is no best way to teach the students and other users of the library the best way to search databases. One develops one's own techniques in order to perform a successful literature search. It depends primarily on the way one interprets the topic being researched or what kind of information one is looking for. The role of the medical librarian is to make the users of library aware of all the resources available to them in all formats and to teach them how to access this information efficiently and the techniques involved in searching the literature databases, including the internet, in the shortest possible time.

The following recommendations arose from the results of the study:

6.5.1 CDTF minutes

There was no mention made in the minutes of the CDTF meetings on the teaching role of the librarians. They (the librarians) should be involved in the future discussions and meetings regarding the problem-based learning curriculum which should include teaching sessions on the various library resources and how to search them. Faculty partnerships and collaboration with all the role players in the curriculum should be encouraged.

6.5.2 Students' response

All the students in the study in both curricula expressed the need for additional reading material. Additional funds need to be allocated to purchase multiple copies of books for the reserved collection to cater for all them. The statistics in Table 1 p. 78, show that there was a significant increase in the number of books, particularly the 2 hour loan books that were issued out from 2001 to 2004.

The students need more training on how to access the library resources, especially the electronic databases so that they may retrieve relevant journal articles in addition to their textbooks. If the students acquire information literacy skills to enhance their information seeking habits then they will acquire lifelong learning skills in information retrieval and empower themselves as end users of the library. They will come back as tomorrow's doctors as independent learners.

The responses of the students' questionnaires revealed that the 2nd year students in Curriculum 2001 did not use the internet as often as the 5th year students did, the computers were not the main reason to come into the library and they did not consult journal articles. For the students to be able to retrieve journal articles by means of a literature search, they either have to use the computers and the internet. Therefore it is imperative that they are taught by the librarians how to access the databases electronically so that they will be able to locate journal articles.

6.5.3 Interviews

6.5.3.1 Facilitators

More emphasis should be placed on teaching and training the facilitators, and all the academic staff to improve their individual abilities at searching the resources in the library, especially the electronic ones. This will enable them to direct and encourage the students in utilizing the library's resources in locating relevant journal articles for their themes. The students do not have to rely solely on the limited number of recommended textbooks in the library which are which are insufficient to cater for all the students. The facilitators will also be contributing and enhancing their own continuing professional development.

6.5.3.2 Librarians

The librarians should be more involved in the curriculum development so that they are aware if the needs of the both the staff and the students. There is a need for credit bearing information literacy courses to be integrated into the curriculum which will eventually

enhance the students information gathering habits.. Apart from utilizing the library's resources efficiently, the students need to learn how to search and evaluate websites on the internet critically and to write their bibliographies correctly. It is not possible for the students to be able to become proficient and expert at information retrieval if they are taught only once in their 5 years of undergraduate study. This has to be reinforced at different levels as they progress towards attaining their degrees. The consistent teaching and training does not only apply to the students but to anyone who uses the library.

Another very important recommendation is that the involvement of the librarians in the development of the students ability to acquire the knowledge on how to access information, and utilize all the library's resources to the maximum or almost, to become information literate should be tested formally fulfilling a part of the requirement for their undergraduate degree. The librarians, with the help of the academic staff who are involved in the planning of the undergraduate curriculum, should develop a module or modules (covering the 5 years) for information retrieval and all aspects related to it that would be compulsory in the curriculum. This will add credibility to the librarians' role in teaching the students to support their studies. Kaplowitz, Darling and Wilkerson (2002) says that it is has been a challenge to the librarians, given students' belief that they already know about libraries and the limited time-frame (roughly 45 minutes) allotted to them to teach the students all they should know about the resources in the library and how to access them.

6.6 FURTHER RESEARCH

More research needs to be done with a larger sample size of the undergraduate students covering all five years of the problem-based learning environment to determine the attitudes of the students towards their need for information retrieval from the various resources available, both electronic and print versions, as they progress from the first to their final year of study. Have they become informed and critical thinkers, and importantly, empowered users of the library.

Further research with a bigger sample of facilitators involved in facilitation of the undergraduate students in the problem-based learning environment from first to the final year of study to determine their requirements as facilitators with reference to information retrieval, their knowledge of the resources, both electronic and print, and their ability to utilize these resources effectively as empowered end-users in the medical library.

If this work is used as a springboard, one should look at the librarian's role in learning and teaching the postgraduate students.

6.7 SUMMARY

The involvement of the faculty and the library in particular in a problem-based learning orientation programme demonstrated to the medical students the importance of the library resources in meeting the information needs of the doctors, specialists and scientists. The importance of the library as a resource for lifelong learning was emphasized. The

strategies and techniques used to perform an efficient literature search are developed over a period of time.

There is room for greater and enhanced collaboration between SUME, the faculty and the librarians, especially with reference to the information literacy skills, so that the students' may improve and enhance their knowledge in locating relevant material which is essential in the PBL curriculum. The emphasis on active learning, critical thinking, information literacy and problem-solving may be a successful way to introduce the students to the library and its resources, reinforcing the importance of library and the librarians' role in the PBL environment.

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APPENDIX 1: STUDENTS' QUESTIONNAIRE

2nd and 5th year students

1. How often do you use the library?
    a) daily
    b) two/three times a week
    c) weekly
    d) monthly
    e) never

2. What are the main reasons for your visits to the library?
    a) information retrieval on a specific topic
    b) research a topic more in depth
    c) to use the computers
    d) to study

3. Do you ask the librarian for help to find information?
    a) regularly
    b) occasionally
    c) never

4. How do you find information required?
    a) ask the librarian
    b) consult books and journals in the library
    c) consult your own books and journals
    d) online databases eg Medline, PubMed
    e) other, please state

5. Which information resource do you use most often?
    a) books
    b) journals
    c) online databases
    d) Internet (world wide web)
    e) CD Roms

6. Has there been any information you required in the last six (6) months that the library was unable to supply?
    a) yes
    b) no

7. If answer is "yes" , which of the following answer is most appropriate?
    a) books not in the library
    b) journals not in the library
    c) books are constantly out on loan
    d) journals are constantly out on loan

e) insufficient copies of the books in the library

8. Have you purchased any textbooks in the past year?
   a) yes , how many?
   b) no

9. Do you feel confident seeking information in the library?
   a) yes
   b) no

10. Do you feel that you are successful at analyzing and applying the information retrieved?
   a) yes
   b) no

11. Does the library provide adequate instruction and training in information retrieval?
   a) yes
   b) no

12. Do you use the Medical Library's Homepage to access the databases?
   a) yes
   b) no

13. Do you access the Medical Library's module on OLS (Open Learning System) for additional resources?
   a) yes
   b) no

14. What style of referencing is used in medical and scientific writing?
   a) Harvard
   b) Vancouver
   c) APA

15. Which of the following are required to write a reference or bibliography for a journal article?
   a) author
   b) title of article
   c) title of journal, volume number and number of pages
   d) place of publication, name of publisher and date
   e) all of the above
   f) a, b & c

APPENDIX 2: FACILITATORS' INTERVIEW QUESTIONS

(Semi-Structured Questions)

Tutors / Facilitators

1. What was your role as Tutor / Facilitator in the Traditional Curriculum?

2. Is the Problem Based Learning Curriculum demanding more from the Tutor / Facilitators?
   - if so, how is it demanding
   - with regard to the resources in the library.

3. What skills did you require and utilize in the Traditional Curriculum?
   - did you require any information literacy skills to tutor the large groups?

4. What skills do you require and utilize in the Problem Based Learning Curriculum?
   - do you feel that you have to acquire more information literacy skills in order to guide the students in the right direction;
   - how does this compare to the Traditional Curriculum?

5. Which skills do you consider as most important and valuable in fulfilling your role as the Tutor / Facilitator?
   - with special reference to additional reading, ie using the library resources more frequently or any other available resources

6. Which skills do you think need further development for you as the Teacher / Facilitator?
   (this question should identify their shortcomings)

7. Do you think that the role of the Medical Librarians have changed significantly with the introduction of PBL? If so, explain how.

APPENDIX 3: AN EXAMPLE OF A RESPONSE FROM THE FACILITATORS

Interview Transcripts

Q. 1
Q: What was your role as a teacher / lecturer in the Traditional Curriculum?
A: IT was to teach 2nd year students histology – the whole class. Mainly lecture + practicals. Class was big, had to split it. Initially there were two groups and later into 3 because the intake of students was increased. The 3rd group had to do something else and that something else was the library. At any one time, 1/3 used the lab, 1/3 did self-study and 1/3 would be using computer aided instruction. The increased number forced us to change our technology somewhat, hands-on, self-directed, and IT. The increased numbers forced us to teach this way. It was not paedogogical. At that I did not understand things underlying student learning, nothing special, nothing formal. It forced me to to IT stuff. We never had to use the library. Used a textbook. Prepared lectures by using the textbooks.

Q. 2
Q: Is the problem-based learning curriculum demanding more from the teachers / facilitators? If so, how demanding is it?
A: Facilitating and still lecturing. A few large group teaching. Has increased my workload. Still do the medical science teaching. More facilitation. Also involved in curriculum development.
Usage of the library - liaised with the library to draw up a booklist – cannot expect the students to buy all the books. So the library has to become a repository for some of the books, students have to use the library more than the TC
The research elective students have to look at journals, electronic resources which they never hadto do even in 6th year of study.

Q. 3
Q: What skills did you require to teach in the Traditional Curriculum?
A: No specialized teaching skills. Most of it was didactic. Prepared lecture session so no particular way of teaching was involved until you looked at other ways of learning, other modes like computer based stuff. I had to teach myself HTML.

Q. 4
Q: What skills do you require and utilize in the in the problem-based learning curriculum?
A: Depends on how deeply you immerse yourself in the paedogogy, depends on the individual and I have chosen to do it quite substantially. Every week I do searches through the library homepage and the electronic resources like, Medical Education Academic Medicine, Medical Teacher.

Q: Do you feel that you require any additional skills in finding information for the themes that are outside your specific discipline?
A: I am not really doing searches per se, not reviewing the literature, just keeping u-to-date. Don't use Medline. Used ERIC . Never had any formal training in how to search. Consider my skills fairly rudimentary. Not difficult to learn the things if you do it all the time.
Suppose to direct the students to the library, refer them to some of texts that the library has. Personally, do try to read up some of the cases, especially 2nd and 3rd years, to become more familiar with the stuff. Do internet searches and have some of my own textbooks. Guide the students with the knowledge you have. More experienced and has the knowledge. Quiz the students where they got their information. Expect the students to search across many books. I ask them how reputable the web site is, if they use the internet. Discriminating in the literature is difficult for the 1st year students.
Librarians role – the students have to do the searches properly, require literature searching skills. From 1st year, students need literacy and numeracy skills should be built into the curriculum.
Did not do all this with the traditional curriculum.
I did a survey – some of the 5th and 6th year students have never ever been to the library, others come to read, certainly not to look for information. They are given it verbally by the teacher, they have their textbooks and that's where they believe their limits are.

Q. 5
Q: Which skills do you consider as most important and valuable in fulfilling your role as a facilitator?
A: I have done quite a lot of research into what the roles of the facilitator should. My personal view is that facilitators should become mentors for the students, not just the academic side of things, development on a personal side. The students should feel comfortable to come to any of their facilitators with any of their problems who then can take it to the student counselor or SUME.

Resources in the library. Survey Theme 1.1 , one of the questions. Were you able to find suitable resource material? 33 of 178 students said no, 16 new students others much older. 24 of 33 said insufficient books in the library and the others were about evaluating information, finding enough detail to meet the learning goals, did not know how to use the internet, did not know how to use the library. All this goes back to the library. The librarian has to teach the students how to access information. The orientation at the beginning of the year is obviously not enough.

Were the students able to cope with the content? 24 of the 178 students no. Most common problem were:
Learning objectives were too broad and the volume of content; SUME – more specfic learning goals
Some of the students said that were a shortage of books.
Obvious that the students need skills to look for information and documenting.

Q. 6

Q: Which skills do you think need further development for you as the teacher / facilitator?

A: More experienced in the teaching field. Would like a workshop on using databases for searches.

Part of development, broaden my knowledge to guide and direct the students. Almost the opposite of what is required in PBL in terms of a process expert.

I still do require training, advanced searching. We are never on top of everything. Have to learn to sift out the information.

Q. 7

Q: Do you think that the role of the Medical Librarians have changed significantly with the introduction of PBL? If so, explain how.

A: Absolutely. Librarians are support staff. Most of you have degrees. In theory you should have academic status.

Previously, sit with your glasses on and let everybody go on about their work. Now you a resource person for the students. Students are in the library all the time and you must be inundated with queries about , how to do this, how to do that, where can I find. You do have to do sessions with large and small groups of students. So you have to prepare for the students. Even your skills, word processing, PowerPoint skills, IT skills have to be sharpened. Some of you have facilitated. You are educators like the rest of the academic staff. Everyone's role has changed. You are doing postgraduate work in medical education and you should be rewarded for that. HPCSA says that within your discipline you should be an expert, your discipline is librarianship but you must also understand the educational principles, philosophy underlying what you are doing. You cannot tell the students that you must become independent, self-directed learners if you don't understand what the rationale for that is. This means that you have to go to the literature to find out what PBL is about and why the curriculum changed from a TC to PBL.

Thank you for allowing me to interview you.

APPENDIX 4: Typical coding of the facilitators' comments into key NVivo NODES

NODES	COMMENTS	NO. OF RESP.
Alert, attentive and listen	…have to be alert, attentive and have a keen "listening" ear as some of the students speak very softly	7
Bedside teaching	…bedside teaching where the initiative rests on the teacher on what to teach	3
Communication skills	… did not get her message across.	7
Current information	… very up to date information.	13
Demanding	… certainly more demanding for the facilitator	14
Didactic	in the traditional curriculum it was all didactic based	11
Electronic resources	…to be more efficient in using the electronic resources that are available in the library.	10
Guide and direct	… most important to me is to guide the students in the right direction	15
In-depth knowledge	Still have to keep yourself updated…	11
Information literacy skills	My information literacy skills are very limited and they could improve; need information literacy skills to locate resources	14
Information management	…students need the skills to document information; the librarians are best equipped to teach the students how to sift the relevant from the irrelevant material	7
Information retrieval	The librarian's play a pivotal role in teaching them how to find information and how to be a lot more selective; know about the various methods of information retrieval	15
Interactive sessions	… group interaction	11
Interaction between staff & librarians	..interaction between the librarians, staff and the students; cooperation between the librarians and the theme organisers	9
Internet	I need to learn how to use the Internet and searching the databases more effectively.	11
Journals	Have journal alerts so I am notified of the latest articles.	8
Labour intensive	Much more labour intensive for the librarians.	2
Large group	I taught in large group, didactic sessions with 200 students at a time.	5

Lectured	Lectured to large groups in the Traditional Curriculum	13
Less demanding	PBL is less demanding, less effort in terms of preparation for tutorials	7
Literature search	…do searches through the library homepage and the electronic resources …	7
More reading	**…**more reading in order to have a background knowledge of the topic; Students are doing a lot more reading	12
Notes and handouts	Handed out notes and directed students to the journal articles	6
Overhead projector	…used an overhead projector to teach.	2
Powerpoint presentations	Powerpoint presentations were done during the lecture	6
Role of librarian	Certainly the roles of the librarians have changed, their responsibilities have increased.	15
Search strategy	… more information if proper searching strategies are used; … which keywords to use; how to refine a search strategy.	7
Teach facilitators	I do feel that as a facilitator I need some training on information literacy	12
Time consuming	facilitation takes up more time; PBL is very time consuming.	15
Traditional Curriculum	…think the Traditional Curriculum was more knowledge dissemination.	. 11
Uncomfortable	…facilitators should feel uncomfortable sitting with students and not knowing the background to the themes.	3
Understand the cases	…do have a knowledge of the cases and problems that are discussed.	4

APPENDIX 5: MEDICAL LIBRARIANS' INTERVIEW QUESTIONS

(Semi-Structured Questions)

Medical Librarians

8. What was your role as Medical Librarian / Teacher in the Traditional Curriculum?

9. Is the Problem Based Learning Curriculum demanding more from the Medical Librarians?

10. What skills did you require and utilize in the Traditional Curriculum?

11. What skills do you require and utilize in the Problem Based Learning Curriculum?

12. Which skills do you consider as most important and valuable in fulfilling your role as the Medical Librarian?

13. Which skills do you think need further development for you as the Medical Librarian?

14. Do you think that librarians should attend the facilitator training workshops for Problem Based Learning?

15. Do you perceive the students in Problem Based Learning using the library any differently from the students in the Traditional Curriculum? If so, explain how.

APPENDIX 6: AN EXAMPLE OF A RESPONSE OF THE MEDICAL LIBRARIANS

Interview Transcripts

Q. 1
Q: What was your role as Medical Librarian / teacher in the Traditional Curriculum?
A: I was solely responsible for user education / orientation about 12 years ago. Prior to that orientation was done primarily by the then Medical Librarian who was in charge of the Medical Library. We concentrated only on the 2nd year students who were new to Medical School as they completed their 1st year on the Main Campus. These students were orientated to the library on the Main Campus. When they came to Medical School in their 2nd year of study, the library was allocated only an hour in which to orientate them to the library and how it functions. During this hour the students were given a talk on the rules and regulations of the library, lending privileges and the general layout of the library. I also taught them how to access OPAC (Online Public Access Catalogue) to enable them to locate books in the library. My colleagues assisted me with showing the students around the library after the general talk on orientation.
This was the one and only time that I formally 'taught' the undergraduate students. The students referred to their prescribed and / or recommended textbooks, notes and handouts from their lecturers. They did not really have to retrieve literature from any other sources, like journal articles to supplement their readings. There were no student computer lans then, I am talking about the period prior to 2000, so there was no access to the Internet in the library for them. If the students required any assistance at all they always came to the librarians for help.
Books were purchased for the students, the prescribed and recommended ones (*books*) went into the Short Loan Collection and the others onto the open shelves.
Until recently, the library subscribed to one major literature database, Medline, which was mainly used by the postgraduate students and academic staff.

Q. 2
Q: Is the Problem-based learning curriculum demanding more from the Medical Librarians?
A: Most definitely. Problem-based learning certainly changed the roles of the librarians especially with regard to user education or information literacy. Both user information literacy and the purchasing of books for PBL go hand in hand. The librarian has to know what is happening in the themes, or modules as they were referred to with the inception of Curriculum 2001, in order to prepare adequate information literacy sessions for the students and to recommend the necessary textbooks for the library to purchase.
Information literacy - when Curriculum 2001 was introduced in 2001 the library was still given an hour in which to give the students a general orientation to the library and a quick demonstration on how to access OPAC. This was one big class in a large lecture room where most of them do not listen except for those sitting in front. I personally felt that this was not good enough as the students were now working on their own, self centred study, and had to retrieve as much information as they could so that they could

contribute in their tutorial sessions. If they were unable to gather information from the correct sources, then they were under utilizing the library which provided the literature. Furthermore, the students now were at an advantage because they had access to the student computer lans. By this time the library had acquired more online databases. Some CD Roms and other computer aided resources were specifically purchased for the PBL students. Due to the very nature of PBL, the students had to access journal articles as well as read their textbooks, unlike the students in the Traditional Curriculum.
Therefore I suggested to SUME that the students be given a general orientation to the library, for one hour and then small groups of students where a demonstration on OPAC, including a hands-on if the time permitted, in the student lan. This would mean more to the students than trying to show and tell them everything in one hour. I am still doing this for the 1st years. I teach the research elective students on how to perform a literature search using the databases, the Internet, how to evaluate the Internet and how to write a bibliography using the Vancouver style of referencing.
One of the main problems, I would call it a problem, was that there were NO prescribed, only recommended textbooks for the PBL students so they were not obliged to buy any books. The library was expected to provide the necessary books for them. However, the theme coordinators and SUME did assist with titles with regard to books which the library purchased if the funds were available. Therefore it was important that the librarians knew the content of the themes in order to recommend certain textbooks to be bought.
What I am presently doing is just the tip of the iceberg. Although I have spoken to some of the staff from SUME, I need to convince them even more that the students should be formally tested and assessed to see what information literacy skills they have acquired.

Q. 3
Q: What skills did you require and utilize in the Traditional Curriculum with special reference to user education and purchasing of books?
A: For myself, I had to have the confidence to be able to talk to and control 200 students in a lecture room. Initially it was very daunting but I soon got used to it.
With regards to orientation, I had to know the rules and regulations of the library, the borrowing privileges and all the technical issues in the library so that I could look at the students and talk to them rather than reading out from notes or transparencies, which is what I used in the early.
As far as user education was concerned we still used the card catalogue to locate books in the library. It was only later that we went online and teaching them how to use OPAC was difficult because this was supposed to be a practical demonstration and as I said earlier, that there were no computers in the beginning. It would have been somewhat abstract for the students. So basically we used the card catalogue and the computer catalogue side by side to locate books in the library until all the books in the library were catalogued on the computer and the card catalogue was phased out.
The librarians really did not order as many books as they would have liked because the recommendations for books came from the lecturers although the head librarian of the Medical Library did order some books herself. The students were expected to buy their own prescribed and recommended books. The budget was favourable in those days and the library was able to purchase books as well as subscribe to a fair number of journals.

Q. 4

Q: What skills do you require and utilize in the problem-based learning curriculum with reference to user education and purchasing of books?

A: When problem-based learning was introduced in 2001, the library was given just one hour, like the Traditional Curriculum, to orientate the students to the library and to teach them how to access the books in the library. I found that the hour was insufficient to do both orientation and information literacy. Orientation had become more involved in that it was no longer just a show and tell session with the students because the rules and regulations, borrowing privileges and other facilities provided by the library had either grown or changed. The hour was just enough for orientation only and I had to rush through OPAC which was very important for the students to understand.

There were no prescribed or recommended books on the students reading lists which now meant that they would have to read more widely, not only books but also some basic journal articles. This meant that the library had to also teach them how to use the Internet and the online databases, both international and national, in order to retrieve journal articles and our web page. So in the 2nd year of PBL but still with the 1st year students, I asked SUME to allocate one hour for orientation with the whole class and another hour with small groups of between 20-30 students each to teach them OPAC, or web page and the databases. Just to explain, our web page contains valuable information on library procedures and all the resources available in the library. This was spread over 2 days. However, I found again that the students were expected to digest too much in a short time and that they may not really need to learn how to access the databases in 1st year. I spoke to SUME again and told them that orientation, OPAC training and our web page were essential in the 1st year but the strategies used to do literature searches, retrieval of journal articles and how to write a bibliography using the Vancouver style should be taught when the need arises. Subsequently, the research elective students are now being taught from 2nd year onwards on how to access the online databases, how to evaluate the Internet sites and how to write a bibliography. There may be more that the students may need to learn as they progress into their senior undergraduate years. This we will know when we liaise with SUME as to the needs of the students.

As librarians, we also need to know and understand the content of the themes so that we can retrieve relevant websites and reading material, both books and journal articles, for the students which we then post on WebCT. Knowing and having a good knowledge of the contents of the themes also helps us to recommend certain textbooks that the library may purchase. As I mentioned earlier, because there are no prescribed or recommended textbooks, the library had to initially purchase multiple copies of the same textbooks to cater for the needs of the students. However, it was not possible to continue to purchase additional copies of the books every year as the library budget was and still is insufficient. Anyway, I feel that it is the responsibility of SUME to ensure that there are necessary funds to purchase the textbooks for the students since they do not “insist” that the students should purchase some of the recommended books themselves.

Q. 5

Q: Which skills do you consider as most important and valuable in fulfilling your role as a Medical Librarian?

A: I think that one of the most important skills for me is **confidence** especially when I teach the students to become "information literate". Trying to teach them how to perform literature searches using a certain strategy, trying to make them understand why it necessary for them to be able to learn how to perform literature searches and then my satisfaction when they **DO** understand the need to become "critical thinkers". If I can get through to fifty percent of the students then I am happy because the other fifty percent will come individually for help when they need it.

The other skill that is important is trying to keep the attention of the students on what I am teaching them at the time. It is very easy for them to drift off because they think that the library is "not so important" until they have difficulty trying to find a book in the library or finding a journal articles or finding relevant websites or writing their bibliographies.

It is also very important for me to have a thorough knowledge of what I have to teach the students, like the databases. I cannot go to one of the classes and fumble with trying to perform a literature search. I have to know what I am doing.

I find it very rewarding if I am able to teach the students these lifelong learning skills. I always tell them that if they acquire these skills now then they can go to any part of the world and perform their own literature searches because the principle of searching remains the same. It is only the interface of the various databases that may be different. Once they get used to it they will have no problems searching the databases.

Finally, the facilitator training workshop that I attended prior to the introduction of PBL is a tremendous help with teaching Information Literacy.

Q. 6

Q: Do you think that you need further development with any of the skills with the introduction of PBL?

A: As the information literacy specialist, I think I need to learn the finer points of teaching even though I've trained as a facilitator. I spend a fair amount of my time teaching the students whether at formal sessions or on individual basis in my office. It is teaching all the time.

Another invaluable skill is to treat each student alike. No one should be treated any differently from the other. The students on the campus come from cultural different backgrounds. Language barriers also pose a problem.

Most of the advantaged students already have a knowledge of accessing OPAC whilst the disadvantaged students may not have heard of OPAC, some of them have never been to a public or school library and they have no idea how to find a book in the library. I think I need to reduce my pace so that everybody understands what is being taught.

Q. 7

Q: Do you think that the librarians should attend the facilitator workshops for problem-based learning?

A: Most definitely. This is the only way that we will be able to understand what PBL is all about and what is expected of us as librarians. If we can understand what is expected of the students, then we can assist them by providing the necessary resources and information. We would be groping in the dark if we do not know and understand the requirements of the students.

Q. 8
Q: Do you perceive the students in problem-based learning using the library any differently from the students in the Traditional Curriculum?
A: Yes
Q: If so, how?
A: The students are definitely using the library far more than the students in the Traditional Curriculum ever did. The students in the Traditional Curriculum used the library mainly as a place to study as most of them bought their own books and they hardly ever used the journals. These students were given all the information they needed in the form of notes and handouts in lectures and they read their books.
The PBL students on the other hand, in addition to studying, **have** to make use of OPAC to locate books in the library, they use the databases to retrieve journal articles and more importantly they ask the librarians for help on an individual basis all the time. They use the library because it is expected of them to look for information in order to solve their "cases" in their themes. Self-centred learning encourages the students to use all the available resources in the library to retrieve relevant information.
They ask for advice more often in that they approach the librarians to help them to search or teach them to search. They use far more material and they are IN the library far more than they ever were before. The resources that they use, an undergraduate never used journals before, was totally unheard of. They now use the journals both print and electronic, they use the electronic databases and they are far more computer literate than the students of the past. The students in the old curriculum felt safer with their prescribed or recommended textbooks.
Finally, I'd like to stress and personally feel that Information Literacy should be a formal course where the students should be assessed as a part of the curriculum.

Thank you for allowing me to interview you.

APPENDIX 7: Typical coding of the Librarians' comments into key NVivo NODES

NODES	COMMENTS	NO. OF RESP.
Assessment	I personally feel that the students should be formally assessed after their teaching and training sessions on OPAC, the databases, the internet and referencing techniques.	2
Changing roles of the librarians	Problem-based learning certainly changed the roles of the librarians especially with regard to user education or information literacy	1
Closed access	It (the reserved book room) was closed access in those days.	1
Confidence	I had to have the confidence to be able to talk to a large group of students	1
Databases	I teach the research elective students on how to perform a literature search using the databases.	4
Facilitator Training Workshop	To equip us to understand I did go to the training courses, acted as a facilitator.	3
Information Literacy skills	More time should be assigned for them to have true user education. ; the strategies used to do literature searches, …	4
Information retrieval	… retrieval of journal articles.	1
Internet	…search the Internet, how to evaluate the Internet	2
Journals	They now use the journals quite happily; … the students had to access journal articles	3
Labour intensive	It was very, very, very labour intensive and there wasn't complete 'buy in' from the start.; I spend a fair amount of my time teaching the students…	2
Library orientation	I was involved in library orientation which was basically show and tell	2
Library resources	When we purchased resources we went strictly by what was published in the handbook.; The library was expected to provide the necessary books.	3
Library WebCT	… which we then post on WebCT.; The students were now using an online platform to communicate with their lecturers (tutors) so the library had to "join the party" as it were, get online onto to WebCT	2
Library web-page	… our web page contains valuable information	

	on library procedures and all the resources available in the library	2
More demanding	PBL by its very nature will demand more from the library and from the personnel from the library	2
No prescribed book	our PBL started with no assigned reading. There **are** no prescribed books.; there were no prescribed or recommended textbooks for the PBL students so they were not obliged to buy any books.	2
OPAC	…demonstration on how to access OPAC.	2
Own textbooks	The students were expected to buy their own textbooks whereas PBL has changed that completely.	2
Prescribed books	They were not expected to read outside what was prescribed or recommended.	2
Read more widely		2
Recommended books	They then introduced a couple of recommended books. (PBL)	2
Research elective students	I teach the research elective students on how to perform a literature search using the databases, the Internet, how to evaluate the Internet and how to write a bibliography using the Vancouver style of referencing.	1
Resistance	…there wasn't complete 'buy in' from the start (SUME)	2
Self-directed learning	as the students were now working on their own, self centred study,	3
Short loan collection	… the prescribed and recommended ones (books) went into the Short Loan Collection	1
Support curriculum	… we know how the students were being taught so that we ourselves could support the curriculum.	3
Transparencies	... transparencies, which is what I used in the early days.	1
Understand themes	The librarian has to know what is happening in the themes	4
User education	To be really effective it should be an ongoing user education where students are taught	2